RECONNECTING ALOHA STADIUM

A DARCH PROJECT SUBMITTED TO THE GRADUATE DIVISION OF THE UNIVERSITY OF HAWAIʻI AT MĀNOA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF ARCHITECTURE

MAY 2018

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Keywords: Aloha Stadium, College Stadium, Community Connectivity, Resilient Design, Ecological Design, Adaptive Reuse

Acknowledgements

I would like to thank my committee chair, Professor Judith Stilgenbauer and committee members Professor Priyam Das and Josh Jackson for their knowledge, guidance, and support during the entire process of this research project. I would also like to thank my family for being supportive and patient with me. Completion of this project wouldn't have been possible without all of your support.

Abstract

Despite the tremendous time and funds expended in constructing sporting sites, such facilities often fail to maintain their designed functions, resulting in a number of spatial and environmental issues. Moreover, many of these facilities lack robust connections with the neighborhoods around them, thus adversely affecting local residents' access and comfort. Yet these spaces should be both multifunctional and welcoming to the general public as popular sites that continually attract and host a wide range of events and activities. This is a particular issue for large-scale venues such as Olympic complexes, professional sports arenas, and college stadiums, with many—including Honolulu's Aloha Stadium—having become disconnected from their surrounding communities. Methods used in this research include precedent studies to identify key principles and design tools necessary for such projects, along with data and spatial analyses and space observation for further investigation. Historical research forms the basis for understanding stadium typology and Aloha Stadium's background. Today, there are two existing proposals for the stadium, one prepared by the State of Hawaiʻi and one by the City and County of Honolulu. This research aims to identify core problems and missing factors to add depth to the new proposal, with the findings being used in designing an ecological- and human-focused proposal for the facility. The design includes reuse of the current structure, an ecologically performative soft and hardscape, and improved connection to the community. The research concludes by comparing the three proposals and demonstrates how ecological- and human-focused design can improve the project and add value to the Aloha Stadium neighborhood.

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Introduction

The cultural importance of sport has been demonstrated throughout history, preserved in written records, art, and other formats. More recently, sport has expanded from its primary roots as a competitive activity into a near-ubiquitous part of daily life, one that increasingly involves social and entertainment aspects. Sport today is a major leisure activity that also brings together people in various roles to facilitate these activities, both directly and indirectly. Stadiums, arenas, and other venues that are important sites for hosting events in a number of sports now have become "homes" to professional, semi-professional, and collegiate teams, as well as to their fans and broader communities. Major metropolitan sports complexes in particular have become a highly significant part of the communities where they are located, impacting their surroundings in many different ways.

Through the process of brainstorming for doctoral project topics, I determined my primary interests lay in public spaces, resilient architecture, and sports. Further research led to articles describing the unfortunate and not infrequent phenomenon of stadiums and large sporting venues ending up underused or even abandoned, despite promises of their extended and continuing benefits to communities. One of the most recent and most conspicuous examples is that of the Rio Olympics, whose facilities were abandoned immediately following the 2017 Summer Games. Although continuing to preach the long-term benefits of the Olympics, the Brazilian government has thus far been unable to hold up their side of the agreement.[1]

Having a large stadium may appear to be an attraction for the area where it is located, ostensibly by drawing in visitors and creating a space with flourishing businesses and public spaces surrounding it. It can, however, produce an opposite effect, as major venues carve out a significant portion of the urban fabric and cause a loss in social connectivity. Today, Honolulu is engaged in a similar discussion concerning Aloha Stadium and its future. The stadium's only home team is the University of Hawaiʻi Rainbow Warriors football team, a team that has only six regular season games each season, with the possibility of some post-season games. A sea of parking also surrounds the stadium, further increasing the size of the land parcel used for this facility.

A new proposal to redevelop this area includes designs for a new stadium. However, despite the significant amounts of money and time invested in today's stadiums, from the design stages to construction and operation of the facilities, their useful service lifespans have become increasingly truncated. As such, the questions I pose in this proposal include whether or not the surrounding community will benefit from the current proposal, whether these designs consider severe climate change and have the potential to contribute to the islands' resiliency, and whether

[1] Anna Jean Kaiser, "Legacy of Rio Olympics So Far Is Series of Unkept Promises," New York Times, February 15, 2017, https://www.nytimes.com/2017/02/15/sports/olympics/rio-stadiums-summer-games.html.

other options exist to preserve the current structure while improving its surroundings.

The research is organized in five chapters. The first chapter covers the general background of the stadium typology, including its history, current trends, and future. The second chapter includes a literature review and precedents related to each subchapter, which will later become the framework for the design. The third chapter is a more thorough research of Aloha Stadium, including its history, current use, site inventory, and an introduction to the existing proposals for the area. In the fourth chapter, the findings are applied to a design at urban (plan), site (plan), and concept scale (section) scales. The fifth chapter comprises the conclusion.

This research aims first to study and identify principles, design strategies, and other criteria absent in the current TOD proposal and State Conceptual Design Proposal for Aloha Stadium, and then goes on to propose a design complementing and supplementing current plans so as to produce an optimal solution for the surrounding communities and the longevity of the stadium.

1. Background

1.1 Sports in Daily Life

Due to the growing scale and popularity of athletic competition, stadiums hosting these events have become an iconic, landmark feature for a number of cities. Stadiums are also used as a platform to showcase new technology for the entire world to see. Although stadium architecture more recently has made major strides in certain innovative fields, the activities themselves have been a feature of human society for quite some time. This section will briefly describe how this typology has developed and highlighted some significant dates.

1.2 History

The history of amphitheaters and spaces for sport dates back centuries and even millennia, but stadiums and arenas in forms constituting the mainstream today made their appearance in Britain's industrialized cities during the 19th century.[2] Such buildings were initially minimal and served several purposes, but they eventually evolved into single-function facilities used for the few to several hours an event would last, remaining vacant until the next event. These facilities suffered a decline as events came to be broadcast on television. This development launched the trend of multi-use stadium designs intended to attract various other non-sporting events to the venues.[3] Thus when considering this subject, we can also start out with some

[2] Rod Sheard, *Sports architecture* (London and New York: Spon Press, 2001), 2.
[3] Ibid., 5.

basic questions: When was the first stadium built? What influences led to such structures becoming the stadiums we have now? What are some similarities and differences in stadiums across the country and around the world today? The following table presents a brief history of unique developments for each period.

Table 1 History and Development of Stadium Architecture

Period	Charactaristics
Greek	･The first stadium originated in the 8th Century B.C. around an athletics track shaped as an elongated "U."
	･The length and width of the track varied. Lengths were from about 183 m to 192 m.
	･The word "stadium" comes from "stadia," an ancient Roman or Greek measurement of length originating from the length of these tracks.
	･Some stands were constructed by excavating on sloped sites, and others were constructed atop the ground using natural materials.
	･Boundries between buildings and landscapes were vague.
	･Hippodromes were also constructed around the same time and in a simular form, but longer.
	･The Olympic Games have existed since 776 B.C.
Roman	･Mortal combat became more popular than track.
	･The stadium shape was changed to an elliptical amphitheatrical form with stands surrounding the field to accomadate the trend.
	･The scale of the structure became too large to rely on natural slopes for the stands.
	･The structures were first made from timber, then stone and concrete later on (1st Century A. D.).
	･The Colosseum is an example of a stadium built during this period. It was used for different functions and could even be flooded for aquatic events.
	･The Roman circus derived from the Greek Hippodromes also developed during this period.
	･Some multi-event hippodromes were developed.
Medieval and After	･Religion became active during this period.
	･During the 300s, societies started to reassess the importance of sports, and with the rise of Christianity, some events associated with paganism were banned.
	･Emperor Theodosius banned the Olympic Games in 393 A.D.
	･The bans resulted in a lull in development and outright abandonment of entertainment facilities, including stadia.
	･Some facilities were converted for other use, such as markets and dwellings.
Renaissance - 19th Century	･Sport was reintroduced, and the facilities started to draw somewhat more attention.
	･The Industrial Revolution and the demand for large public events prompted the need for stadia.
	･The purpose of the stadium in the early ages was to fit as many people as possible, but conditions were poor.
	･The Olympic Games are revived at the end of the 19th Century, with the first modern Olympic games held at Athens in 1896.
20th Century	･The first purpose-designed stadium was built in 1908 for the London Olympics.
	･The stadium was very crowded, with an uncomfortable interior.
	･Stadia started to develop especially in the UK, for their soccer (football) and rugby teams.
	･The Olympics was a place to showcase the country to the world, leading to more innovative designs and improvements for broadcasting.
	･Stadia for the two top sports in the USA (American football and baseball) started to spread after WWII.
	･Implementation of safety measures began after a series of mass casualties.
21st Century	･Stadiums started to become multi-use facilities hosting multiple sports, concerts, events, graduations, etc.
	･Support spaces within the stadium (offices, restaurants, shops, lounges, etc.) also shared functions.
	･Luxury boxes and VIP spaces were included.

Source: Geraint John and Rod Sheard, *Stadia: A Design and Development Guide* (Oxford: Architectural Press, 2000), 3-18.

Graphic: By Author.

Although the development of stadium architecture stagnated for some time, one can see how a simple U-shaped field—more a feature of the landscape than a full-fledged facility—would be built to represent its city and showcase the most recent technology. The images below are floor plans and sections of the earliest stadium (Fig. 1) and the Olympic Stadium built for the 2012 Games in London (Fig. 2). While it is evident that the level of complexity and scale of projects has increased, do the facilities truly serve their function better? Are stadiums today tied in with the urban and social fabric as much as they were in ancient times?

Figure 1-1 Floor plan and section of the U-shaped stadium built in 331 BC.

Source: A Design and Development Guide.

Figure 1-2 Floor plan and a section of London Olympic Stadium of 2012.

Source: Populous.

1.3 College Stadiums in North America

The history of college stadiums resembles that of stadiums in general. Many of the first of such facilities built in the early 20th Century had smaller capacities ranging from a few thousand to slightly more than 10,000 spectators. The subsequent rise in the popularity of organized sports was matched by an expansion in stadium capacities, which rapidly increased to an average of 50,000 seats. Today, college sports play a significant role in bringing students and the community together. This is especially true for football, with teams at many North American schools attracting tens of thousands of fans. Although a facility's success depends in part on the team’s record, other factors such as location, services, transportation, and design can also make a difference. Meanwhile, professional stadiums have morphed into luxury facilities that incorporate the latest technologies in every feature, from structure to services; this component is discussed further in the following section. These stadiums have also grown to massive sizes, with some holding over 100,000 spectators.

The following matrix was developed as a compilation of stadiums similar in size to Aloha Stadium, which today has a capacity of 50,000. Stadiums selected are from NCAA Division I Collegiate stadiums with the capacity of 40,000 to 60,000 and past and current NFL stadiums with a capacity of 35,000 to 70,000. NFL stadiums are included due to their multipurpose use, a key aspect shared by Aloha Stadium. The matrix includes the following information:

- Name of stadium
- Location (city, state)
- Occupying team or school
- Year opened (and expanded or renovated)
- Capacity
- Type of user (professional, college, both)
- Population of city (2016)
- Population density of city
- Category of location (urban, suburban, out of city)
- Proximity to commercial airport (miles)
- Public transportation available
- Presence or absence of any public space on site
- Susceptibility to flooding (1-3, low-high)

An analysis of this matrix resulted in several findings that are useful in redesigning a stadium. Findings at the site level include the fact that many college stadiums are aging and have gone through renovations, whereas a trend seen with newer stadiums is in the effort to acquire LEED certifications, suggesting that newer stadiums are incorporating more environmental strategies. Some of the urban scale findings include population and infrastructure-related concepts. Although the city populations in the matrix range from 14,014 (Halawa, Aloha Stadium,) to 2,705,000 (Chicago, Soldier Stadium), population density exhibits a narrower range, mostly in the thousands, with certain exceptions. While Halawa is on the higher end of the scale for density, the nearby area's low population may cause difficulties in attracting users on non-event days. Another fact is that many of the newer stadiums, especially those built in the twenty-first century, have light rail or trains servicing the area. The completion of the HART (Honolulu Authority for Rapid Transit) rail transit project on Oahu will be a central factor in plans to establish a thriving new stadium neighborhood. The design portion of this research, among other aspects, will address these findings.

Table 2 Matrix of Stadiums Similar in Size to Aloha Stadium

NAME	LOCATION	TEAM / SCHOOL	YEAR COMPLETED	CAPACITY	USER (PRO, COLLEGE)	POPULATION OF CITY (2016)	POPULATION DENSITY (ppsm)	URBAN/ SUBURBAN/ RURAL	PROXIMITY TO AIRPORT (mi)	PUBLIC TRANSPORTATION AVAILABLE	PUBLIC SPACE	FLOODING (1-3, low-high)	NOTES
PAST NFL (Capasity of 35,000-70,000)													
Edward Jones Dome	St. Louis, MO	Rams	1995/2010	66,965	P	315,685	4,785	U	5.9 (4.2)	Bus, Metro	Y	1 (River)	
Franklin Field	Philadelphia, PA	Eagles	1895/1922	52,958	P	1,568,000	11,685	U	8.3 (5.6)	Bus, Train	Y	1 (River)	Historic, College
RFK Memorial Stadium	Washington, D.C.	Redskins	1961	45,596	P	681,107	11,367	U	7 (4.6)	Bike, Bus, Metro	Y (Small)	2 (Lake, River)	
CURRENT NFL (Capasity of 35,000-70,000)													
Lincoln Financial Field	Philadelphia, PA	Eagles	2003	69,596	P/C	1,568,000	11,685	U	5.9 (4.2)	Bus, Subway	N	3	LEED-Silver
Nissan Stadium	Nashville, TN	Titans	1999	69,143	P	684,410	1,301	U	8.1 (6.5)	Bus	N	1 (River)	
Levi's Stadium	Santa Clara, CA	49ers	2014	68,500	P	125,948	6,841	U	5.4 (3)	Bus, Light Rail	N (Great Amer.)	2 (Creek)	LEED-Gold
Heinz Field	Pittsburgh, PA	Steelers	2001	68,400	P/C	303,625	5,483	U	19.3 (12)	Light Rail	Y	1 (River)	
CenturyLink Field	Seattle, WA	Seahawks	2002	68,000	P	704,352	8,407	U	12.9 (11)	Train, Bus	Y	2 (Bay)	Precedent - Waterfront Seattle
FirstEnergy Stadium	Cleveland, OH	Browns	1999	67,895	P	385,809	5,107	U	16 (9.5)	Bus, Light Rail, Train	N	3	
EverBank Field	Jacksonville, FL	Jaguars	1995	67,246	P	880,619	1,178	U	16 (11.3)	Bus, Shuttle	N	2 (River)	
Lucas Oil Stadium	Indianapolis, IN	Colts	2008	67,000	P	864,711	2,350	U	9.8 (7)	Bus	N	3	
Gillette Stadium	Foxborough, MA	Patriots	2002	66,829	P	16,693	799	S	30.8 (23)	Train	Y	3	
U.S. Bank Stadium	Minneapolis, MN	Vikings	2016	66,655	P	413,651	7,660	U	9.3 (8)	Bus, Light Rail, Train	Y	3	LEED-Gold
Raymond James Stadium	Tampa, FL	Buccaneers	1998	65,890	P/C	377,165	3,325	U	5.2 (1.5)	Bus	N	2 (River, Bay)	
Paul Brown Stadium	Cincinnati, OH	Bengals	2000	65,515	P	298,800	3,810	U	13.1 (8.1)	Bus, Streetcar	N	3	Precedent - Smale Riverfront Park
Hard Rock Stadium	Miami Gardens, FL	Dolphins	1987	65,326	P/C	113,058	6,199	U	19 (11.2)	Bus	N	1 (Canal)	
Ford Field	Detroit, MI	Lions	2002	65,000	P	672,795	5,000	U	22.5 (19)	Bus	N	2 (River)	
University of Phoenix Stadium	Glendale, AZ	Cardinals	2006	63,400	P	245,895	4,142	U	21.2 (15)	N/A	N	3	
Soldier Field	Chicago, IL	Bears	1924	61,500	P	2,705,000	11,898	U	22.5 (17)	Bus, Train	N	3	LEED-EB
Oakland-Alameda County Coliseum	Oakland, CA	Raiders	1966	53,286	P	420,005	7,515	U	3.4 (2.8)	Bus, Subway	N	3	
StubHub Center	Carson, CA	Chargers	2003	30,000	P	92,727	4,956	U	12.8 (9.8)	Bus	N	3	
COLLEGE (Capasity of 40,000-60,000)													
Mountaineer Field at Milan Pusker Stadium	Morgantown, WV	West Virginia	1980/2004	60,000	C	30,855	2,916	U	3 (1.9)	Bus, Tram	Y	2 (River)	
Carter–Finley Stadium	Raleigh, NC	NC State	1966/2006	57,583	C	456,880	3,284	S	8.5 (6.5)	Bus, Train	N	3	
Ross–Ade Stadium	West Lafayette, IN	Purdue	1924/2006	57,236	C	45,872	3,324	S*	68 (59.5)	Bus	N	2 (Golf Course)	
Sun Devil Stadium	Tempe, AZ	Arizona State	1958/2016	56,232	C	182,498	4,566	U	6.2 (3.3)	Bus, Light Rail	Y	1 (River)	
Arizona Stadium	Tucson, AZ	Arizona	1928/1988	55,675	C	530,706	2,247	U	10.1 (7.5)	Bus, Light Rail, (Amtrak)	N	3	
Bobby Dodd Stadium	Atlanta, GA	Georgia Tech	1913/2003	55,000	C	472,522	3,547	U	10.8 (9)	Bus, Metro	Y	3	
Papa John's Cardinal Stadium	Louisville, KY	Louisville	1998/2009	55,000	C	1,270,000	1,924	U	3 (1.5)	Bus	Y	3	
Autzen Stadium	Eugene, OR	Oregon	1967/2002	53,800	C	166,575	3,572	U	10.5 (8.3)	Bus, (Amtrak)	Y	1 (River)	
Memorial Stadium	Bloomington, IN	Indiana	1960/2010	52,929	C	84,465	2,874	U	6.6 (5.12)	Bus	Y	2 (Lake)	
High Point Solutions Stadium	Piscataway, NJ	Rutgers	1994/2009	52,454	C	56,044 (2010)	2975.5	S	21.5 (19.3)	Shuttle	Y	1 (River)	
Capital One Field at Maryland Stadium	College Park, MD	Maryland	1950/2009	51,802	C	15,035	5,400	S	14.7 (10.9)	Bus, (Metro)	Y	3	
Sun Bowl Stadium	El Paso, TX	UTEP	1963/1981	51,500	C	683,080	2,676	U	8 (6.8)	Bus, (Amtrak)	N	3	
TCF Bank Stadium	Minneapolis, MN	Minnesota	2009	50,805	C	413,651	7,660	U	9.5 (6.5)	Bus, Light Rail	N	1 (River)	LEED-Silver
Stanford Stadium	Stanford, CA	Stanford	2006	50,424	C	13,809 (2010)	5,000	U	15 (6.5)	Bus, (Train)	Y	3	
Folsom Field	Boulder, CO	Colorado	1924/2003	50,183	C	108,090	5,352	U	41 (33.4)	Bus	Y	1 (Creek)	
Memorial Stadium	Lawrence, KS	Kansas	1921/1999	50,071	C	95,358	2,600	S	51 (36.5)	Bus, (Amtrak)	Y	3	
***Aloha Stadium**	Halawa, HI	Hawai'i	1975/2003	50,000	C/P	14,014 (2010)	6,100	U	3.6 (2.8)	Bus	Y	1(Streem), 2 (Bay)	Honolulu 337,256 (2010)
Bill Snyder Family Football Stadium	Manhattan, KS	Kansas State	1968/2005	50,000	C	54,983	2,800	S	8 (6)	Shuttle	N	3	
Dowdy–Ficklen Stadium	Greenville, NC	East Carolina	1963/2010	50,000	C	91,495	3,200	S	3.5 (2.7)	ECU Transit	Y	2 (River)	
Carrier Dome	Syracse, NY	Syracuse	1980	49,250	C	143,378	5,725	U	8.5 (5.5)	Bus	N	2 (Lake)	
Ryan Field	Evanson, IL	Northwestern	1926/1997	47,130	C	74,895	9,628	U	15.7 (12.4)	Bus, Subway	Y	1 (Lake)	
Rice Stadium	Houston, TX	Rice	1950	47,000	C	2,303,000	3,660	U	10.9 (8.9)	Bus, Light Rail	Y	3	
Falcon Stadium	Colorado Springs, CO	Air Force	1962	46,692	C	465,101	2,388	S	24.6 (15.8)	N/A?	N	3	
Falcon Stadium	Salt Lake City, UT	Utah	1998/1998	45,807	C	193,744	1,678	U	9.6 (7.2)	Bus, Rail	N	3	
Reser Stadium	Corvallis, OR	Oregon State	1953/2005	45,674	C	57,110	3,854	U	35.2 (30.6)	Bus	Y	1 (River)	
McLane Stadium	Waco, TX	Baylor	2014	45,140	C	134,432	1,350	U	7.2 (5.9)	Shuttle	N	1 (River)	Precedent
Amon G. Carter Stadium	Fort Worth, TX	TCU	1929/2012	45,000	C	854,113	2,181	U	27.8 (22.6)	Bus	N	3	LEED-Silver
Alumni Stadium	Newton, MA	Boston College	1957/1995	44,500	C	89,045	470	U	10.1 (7.9)	Bus, Light Rail	Y	1 (Reservoir)	
Spectrum Stadium	Orlando, FL	UCF	2007	44,206	C	277,173	1,017	U	20 (13.8)	Bus	Y	1 (Lake)	
Sonny Lubick Field at Colorado State Stadium	Fort Collins, CO	Colorado State	2017	45,200	C	164,207	2,942	S	68.7 (53.7)	Bus, Shuttle	Y	1 (Reservoir)	
Bulldog Stadium	Fresno, CA	Fresno State	1980/1992	41,031	C	522,053	4,563	U	5.3 (3.7)	Bus	Y	3	
Vanderbilt Stadium	Nashville, TN	Vanderbilt	1922/2012	40,350	C	684,410	1,301	U	10.3 (7.9)	Bus	Y	2 (River)	
Nippert Stadium	Cincinnati, OH	Cincinnati	1915/2015	40,000	C	298,800	3,810	U	6.2 (5.1)	Bus	N	2 (River)	
Wallace Wade Stadium	Durham, NC	Duke	1929/2016	40,000	C	263,016	2,449	S	14.8 (11.8)	Bus	N	3	
Pratt & Whitney Stadium at Rentschler Field	East Hartford, CT	Connecticut	2003	40,000	C	51,252 (2010)	3200	S	17.6 (12.3)	Bus	Y	1 (River)	
TDECU Stadium	Houston, TX	Houston	2014	40,000	C	2,303,000	3,660	U	8.1 (6.3)	Bus, Light Rail	N	3	

Stadiums mentioned in document.

Stadiums that are LEED certified.

Source: U.S. Census Bureau, The U.S. Green Building Council, Google Maps, Wikipedia. Graphic: By Author.

1.4 Trends Today

Stadiums today are constantly being upgraded, rebuilt, and renovated, but not due to particular structural failings or issues making them no longer safe to operate. The changes have been made primarily to lure more spectators away from watching comfortably from their sofa at home and instead induce them to watch events in person at an actual stadium. Luxury booths, bars, restaurants, and other amenities that are not elements of traditional stadiums are being included to enhance the stadium experience and provide a level of enjoyment one cannot get by watching games on TV at home. The push to renew venues comes from this need to provide something unique, with guidelines set by the respective leagues amounting to standards to be followed by cities wishing to host teams. Although efforts have been made to improve multi-functionality to ensure these spaces are occupied more frequently, there is still room for improvement towards a better design solution.

Another major factor is the rapid development of technology in recent years. In addition to the well-known high-definition Jumbotrons that display the broadcast view of the game, placement of smaller TV screens around stadiums has become the norm. Sound systems have also been improved, further enhancing the experience. Lighting and climate control systems are monitored to run efficiently while still providing comfort to the visitors. Wi-Fi connections are also accessible for mobile device users who want to stay connected with the outside world.[4]

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[4] Christopher R. Lamberth, "Trends in Stadium Design: A Whole New Game," *Implications 4*, no.6 (2010): 4-5.

Until very recently, stadium typology was very inwardly focused, concentrating primarily on the structure itself and its function, with minimal consideration given to the urban context. A stadium’s connections to its surroundings are even more critical now that stadiums are typically placed closer and closer to city centers. Today, it is not uncommon to see stadiums being treated as an aspect of Transit Oriented Development (TOD), thereby addressing the issue of improving accessibility to the stadium’s surroundings. Efforts are being made to enhance the experience of the immediate stadium context, with the incorporation of vegetation, landscaping, and parks to create transitional spaces between the community, instead of merely having broad expanses of parking lots.[5] Lastly, the most recent trend—mentioned in the previous section—is the gradual incorporation of various environmental design strategies into stadium designs. This will be further discussed in a later section about ecological design.

Figure 1-3 Mercedes-Benz Stadium in Atlanta is the first stadium to be certified LEED Platinum.

Source: HOK.

[5] Ibid., 2-3.

1.5 Location and Infrastructure

1.5.1 Location

The placement of a stadium can make a significant difference in how—and how often—the facility is used, as well as the number of people who can reach the site. Stadiums originally were established as a part of the urban fabric serving their neighborhoods, and they were much more limited in size in comparison with today's sites. In the period from the 1950s to the 1970s, when the size of facilities began to increase, the ideal location became a suburban or an out-of-town site where owners could find larger chunks of land.[6,7] The fact that visitors had to drive to get to a game made for an even bigger footprint, as parking was also necessary. Today we are starting to see more building towards the city centers, where sites are accessible via public transportation, or as part of an urban development that enables visitors to enjoy other activities conveniently.

Locations can be divided into three categories: central urban; semi-urban; and out of town (Fig. 3).[8] Each has its advantages and disadvantages, and it is of course essential to evaluate locations carefully when deciding where to build. The most prominent advantage of central urban sites is the accessibility to their surroundings, but it can be extremely challenging to find sufficient space within the urban fabric,

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[6] Geraint John and Rod Sheard, *Stadia: A Design and Development Guide* (Oxford: Architectural Press, 2000), 33.

[7] Bill Lindeke, "Considering stadium design, The Yard — and a gray area between public and private space," *MinnPost*, June 19, 2014, https://www.minnpost.com/cityscape/2014/06/considering-stadium-design-yard-and-gray-area-between-public-and-private-space.

[8] Mark Fenwick, Trygve Bornø, Thierry Favre, and Joan Tusell, "UEFA Guide to Quality Stadiums," (2011), 34-35.

with costs being an additional burden. Semi-urban sites have the advantage of being not excessively distant from the city center, with the additional advantages of adequate transportation options and naturally lower land costs. Out-of-town sites obviously lower the cost of the land, but poor transportation options along with smaller immediate populations could prove to be a challenge. The facility's scale could also hinder connectivity in the neighborhood, posing an additional challenge.[9]

Figure 1-4 An urban and suburban stadium. CenturyLink Field (left) and Kansas Stadium (right). Source: Google Earth.

Another consideration that should be included when researching locations is the need to evaluate the possibility of change and adaptation.[10] Rapidly evolving culture, the possibility of development, renovations to incorporate advanced technology, and changes in the use of the particular stadium are factors that can arise at any time.

[9] Ibid.

[10] Rod Sheard, *Sports Architecture* (London and New York: Spon Press, 2001), 37.

Flexibility in use can be the key to the decision on renovation or a complete rebuild of the facility.

1.5.2 Transportation

Transportation is an important and even critical factor in determining a stadium's location. Furthermore, it can be a crucial element in determining the stadium's longevity. The large-scale events held at these facilities attract large numbers of people, placing stresses on transportation infrastructure, in terms of individual private vehicle traffic as well as public transportation systems. This may not be a significant issue for a facility hosting local events exclusively, but when larger events such as international competitions, conventions, concerts, and professional and collegiate sporting events are involved, the value of having an airport nearby and transportation options to and from the airport becomes clear.[11]

Having bus stops or train stations right on site is increasingly common and is proving to be a great advantage.[12] In past times, accessibility was not much of a consideration: there was not much in the way of choice, as the only way spectators could view sporting events live was to see them at the stadium. Today, people can watch games from home, at a local bar, or anywhere they can find a TV, including on their cell phones and smartphones. If spectators find access to the stadium to be inconvenient, it is less likely they will make the effort to watch the event on site.

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[11] Martin Wimmer, *Construction and Design Manual: Stadium Buildings* (Berlin: DOM publishers, 2016), 68-69.

[12] Mark Fenwick, Trygve Bornø, Thierry Favre, and Joan Tusell, "UEFA Guide to Quality Stadiums," (2011), 38.

Recent projects such as Husky Stadium at the University of Washington (collegiate), Chase Center in San Francisco (professional), and Perth Stadium in Australia (professional) simultaneously incorporated transportation projects into their designs. The Perth Stadium project includes a pedestrian bridge that provides visitors with another option to cross from the opposite side of the river next to the site; a promotional video for the site presents the experience with the concept that an event there "begins with your journey…"[13]

Figure 1-5 Traffic flow diagram using various modes of transportation after an event.

Source: Perth Stadium.

[13] "The journey to Perth Stadium," YouTube Video, 3:14, posted by new "Perth Stadium," Oct 17, 2016, https://www.youtube.com/watch?time_continue=35&v=ygd3OmJoyP4.

1.5.3 Other Factors

In addition to the two main factors above, there are other elements that can contribute to the success of a project. One, obviously, is obtaining land for the stadium. Since finding a lot large enough to accommodate a stadium is often difficult, multiple smaller adjacent lots are purchased and combined instead. Overcoming land use and zoning issues may be a challenge when designing at the large scale. In determining whether the immediate surroundings (the space in between the venue and the neighborhood) can be incorporated as an element of the design, it is important to clarify whether or not the site is appropriate for sporting facilities and if it is suitable for recreational and commercial use. Environmental factors such as topography, water table, and soil type help inform decisions on what is feasible and what design efforts are required.

1.6 Ecological Design

In comparison with other building and urban typologies, environmental friendliness has been a challenge in stadium architecture, yet this aspect has increasingly come to incorporate certain principles of sustainable design. Environmentally sustainable development (ESD) is mentioned in guidelines for stadium design, with a particular focus on energy and water conservation and waste management.[14,15] Some projects strive to acquire certification for environmental performance, such as Leadership in Energy and Environmental Design (LEED), a

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[14] Geraint John and Rod Sheard, *Stadia: A Design and Development Guide* (Oxford: Architectural Press, 2000), 221-222.

[15] Rod Sheard, Sports Architecture (London and New York: Spon Press, 2001), 12.

standard in the US developed by United States Green Building Council (USGBC), and Europe's Building Research Establishment Environmental Assessment Method (BREEAM), published by Building Research Establishment (BRE).[16]

Small changes can make a tremendous difference in the operation of such a large facility. There are few stadiums that have a low impact on the environment, but in recent years we have begun to see results from such efforts. The following list states the primary objectives of these efforts:[17,18,19]

- Minimizing the demand for energy
- Ensuring use of renewable energy
- Realizing efficient use of non-renewable energy

User awareness is also crucial in reducing demand, but this can be accomplished with smart designs using passive cooling and heating strategies. Water catchment systems can also help with water conservation. While the impact of such smaller-scale efforts may not be immediately apparent, they do and will contribute both to the long-term environmental effects and operation costs. Choices in the material should also be considered carefully, as this not only makes a difference economically, it also affects life-cycle cost and the environmental impact.

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[16] Mark Fenwick, Trygve Bornø, Thierry Favre, and Joan Tusell, "UEFA Guide to Quality Stadiums," (2011), 92-93.
[17] John and Sheard, *Stadia: A Design and Development Guide*, (Oxford: Architectural Press, 2000), 224.
[18] Sheard, *Sports Architecture* (London and New York: Spon Press, 2001), 60.
[19] Mark Fenwick, et al., "UEFA Guide to Quality Stadiums," 92-93.

It is common or even usual for stadiums to be located near coastlines, lakesides, and riversides. However, global warming and sea level rise may pose significant problems for some sites unless these issues are taken into consideration in the site's planning and developing stages. While stadiums also hold the potential to function as evacuation centers during natural disasters, a report published by the Department of Homeland Security states that "[o]ver 90 percent of stadiums and arenas assessed by DHS are dependent upon water, wastewater, electric power to maintain core operations," and partial or total failure of any of these systems would cause the quality of the particular facility being used to decline rapidly.[20]

1.7 Stadiums as Public Space

In addition to issues in updating stadiums and their transportation and environmental qualities, improving the public space will also come to be an important factor in a facility's longevity. Olympic cities that have been successful in maintaining their facilities and saving them from abandonment are usually those that either leveraged hosting the Games as an opportunity to improve their infrastructure and public transportation or had existing systems to support access for such large events. In the article "Power games [power olympics]," Mark Venables says that London took advantage of the Games to improve electrical infrastructure for the long run and created opportunities for various businesses and development after the Olympics.[21]

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[20] Office of cyber infrastructure analysis, *Sector Resilience Report: Stadiums and Arenas*, Washington D.C.: Department of Homeland Security, 2015. Accessed September 27, 2017, http://content.govdelivery.com/attachments/MIMSP/2015/01/21/file_attachments/357698/OCIA%2B-%2BStadium%2Band%2BArena%2BResilience.pdf.

[21] Mark Venables, "Power games [power olympics]," *Engineering & Technology* 4, no. 1 (2009): 58-61.

This can also be true for any type of stadium, including professional and colligate facilities.

According to Geraint John and Rod Sheard, “Parking is most convenient if located in the area immediately surrounding the stadium, and at the same level as the exits/entrances. But this tends to be an inefficient use of land.”[22] It is also unwelcoming, as the appearance of the large bulky stadium standing in the middle of a sea of cars may be unpleasant not only for visitors, but also for those in the community. Many stadiums still use this type of setup, but some have begun to employ vegetation to mitigate unsightliness, while others even create public spaces that the public can access anytime. One downside, however, is that maintenance of vegetation can incur significant costs. Each site has different needs, and this type of in-between space exists for the public’s use.

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[22] Geraint John and Rod Sheard, *Stadia: A Design and Development Guide* (Oxford: Architectural Press, 2000), 39.

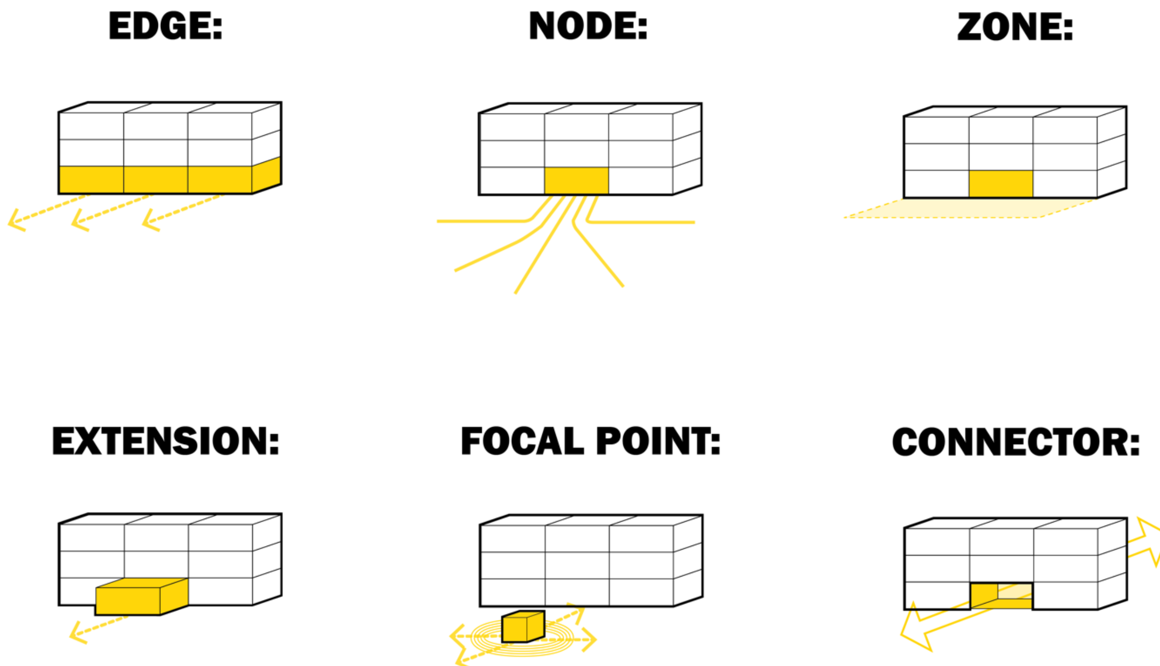

Figure 1-6 Diagram of the types of connections a building could have with the public.

Source: Otto Paans and Ralf Pasel, *Situational Urbanism*. Graphic: By Author.

Careful treatment of edge conditions facing the public also can affect how space may end up being used by the public. Instead of enormous solid façades, softer edges are more engaging and welcoming, which in turn encourages people to use the space. The treatment of ground floors or spaces adjacent to a public realm should incorporate designs to engage the community. This can be accomplished by organizing spaces and types of relationships, which promotes thinking not only about the space within the property, but also about the movement and flow of the space.[23]

[23] Otto Paans and Ralf Pasel, *Situational Urbanism*, (Berlin: jovis Verlag GmbH, 2014), 34.

1.8 Conclusion

The general history includes supporting evidence as to how this typology has developed, providing much-needed information for use in further investigation and proposals for any particular site. During the shorter history of the modern stadium, rapid development in building technology has contributed to improving the function and capacity of these facilities. In contrast, the development of ecological and human focused design strategies has been much more gradual. Succeeding in the aim of siting, designing, and constructing stadiums today so that they bring benefits to all stakeholders requires further study of these heretofore neglected aspects, while maintaining design strategies and technology that have been proven to be successful.

2. Precedents and Framework

2.1 Overall Framework

This chapter intends to establish a framework for a speculative new Aloha Stadium redesign proposal. Although the existing proposals (the State's "Aloha Stadium Redevelopment Report" and the City's "Halawa Area Transit Oriented Development Plan") address many significant factors that will improve essential stadium functions with a strong design, further understanding and studies of the topics introduced in this chapter—public space, access and transportation, ecological design, sea level rise and flooding, and stadium reuse—can add depth to the design. Understanding current practices and the benefits of these topics through a review of the literature and precedent studies should prove helpful in deciding which design to employ. Several precedent studies of stadiums or similar context projects related to the framework categories will follow the write-up portion at the end of each subchapter.

2.2 Public Space

There are many definitions of "public space," ranging from land that is strictly owned by the public to all spaces accessible to the public, including "privately owned spaces that are accessible to the public" but excluding "publicly owned spaces that are not accessible to the public."[24] Public spaces include not only parks, plazas, and squares, but can also include features such as streets and parking lots, coffee shops,

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[24] Vikas Mehta, "Evaluating public space," *Journal of Urban Design* 19, no. 1 (2014): 54.

and even lobbies of buildings. Properly defining what constitutes a good public space is challenging, though, as requirements in designing good public spaces are themselves not clearly defined. Mehta attempts to evaluate “public space” using the five categories of safety, comfort, pleasure, inclusiveness (connectivity), and meaningful activities.[25] This section will focus on exploring how these types of spaces can be improved by learning from past studies, how they may be activated through design, and what benefits may accrue from creating such spaces.

Despite being written in 1889, the following argument by Austrian architect Camillo Sitte still applies in designing public spaces today. Sitte was one of the first individuals to be concerned about the increasingly systematic and technological way modern cities were being built, with less attention being paid to the surroundings of the new buildings. Some of the principles he articulated for improved public spaces included a focus on keeping the center of the space free and flexible for activities, having an enclosure, and the need for spaces with irregular, less grid-like forms and appropriate proportions in comparison to the surroundings, enabling people to comprehend the space.[26]

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[25] Vikas Mehta, "Evaluating public space," *Journal of Urban Design* 19, no. 1 (2014): 54.

[26] Camillo Sitte, *City Planning According to Artistic Principles* (London: Phaidon Press, 1965).

Figure 2-1 Studies of Medieval Plazas.

Source: Camillo Sitte, The Art of Building Cities: City Building According to Its Artistic Fundamentals.

Danish architect Jan Gehl states there are three different types of activities that occur in these public spaces: necessary activities (activities required in order to participate in daily life); optional activities (with participation based on individuals' desire to do so); and social activities (occurring when people in public spaces interact).[27] In bad design, necessary activities comprise the dominant activity, whereas, in good design, necessary activities occur at about the same rate, but with optional activities occurring more frequently as good design makes such spaces

[27] Jan Gehl, *Life Between Buildings* (Washington, D.C.: Island Press, 2011), 9.

more inviting, thereby prompting a greater desire to participate.[28] As a result, social activities occur more often, and interactions between and among neighborhood residents increase, with a greater sense of community developing from that. Gehl also mentions that use of public spaces evolves with the society and with lifestyle trends; today, many automobile-centered cities around the world are making an effort to transform themselves into pedestrian-friendly cities.[29] The scale of spaces is also important, as it pertains to occupants' comfort and the type of activities that planners intend to foster (Fig. 7,8).

Figure 2-2 A large open space at the La Défense (France).

Source: Mount Airy Films, shutterstock.com.

[28] Ibid., 11.

[29] Ibid., 50.

Figure 2-3 A cozy Paley Park (NYC) provides some respite within a busy city.

Source: Project for Public Spaces.

Pritzker Prize-winning Japanese architect Fumihiko Maki also mentions the importance of open spaces. He further states that open spaces can function as the center of the community and that such spaces should be capable of hosting diverse age groups and activities, maintaining human scale, humor, and flexible arrangements suiting an ever-changing society. By doing so, he says, "…they can continue to function as places of rest and recreation," but also "have the potential to make our urban lives much richer."[30]

[30] Fumihiko Maki, "Open Space–Utopia is not a Building," *Architectural Review*, March 17, 2017, https://www.architectural-review.com/rethink/open-space-utopia-is-not-a-building/10017731.article?blocktitle=Fumihiko-Maki&contentID=18568.

In the case of stadiums, the parking lot and parks surrounding the actual structure are considered to be public spaces. On game days, these spaces are packed with vehicles while people hold tailgate parties before the game as they prepare for the event soon to take place inside the stadium. In fact, tailgating is the primary attraction for some spectators, as they are immersed in the event's distinctive atmosphere. This space—the parking lot—may appear to be lively and well-used when visited on a game day, but at times when there is no event being held, it becomes a vacant lot, inaccessible and unavailable for use by residents of the neighborhood. As mentioned by Maki, the flexibility of the space over time is important, yet it is also crucial to design the space to be transformable or multifunctional, allowing it to be utilized year-round.

In consideration of these criteria for well-designed public spaces, the following projects were selected for the precedent studies: McLane Stadium and the Backyard (at Mercedes-Benz Stadium) are examples of multipurpose open spaces that can be used for tailgating on game days in college and professional settings, respectively; Sammons Park is a public space in the Dallas arts district providing outdoor spaces and an anchor for programs in the area. As a multi-use stadium, Aloha Stadium requires flexibility in its adjacent public spaces, where uses can be adapted in accordance with the event. The three projects in the following precedent studies exhibit the qualities of good public space, providing excellent examples for Aloha Stadium as a multi-use stadium located in a community in need of an anchor point.

Figure 2-4 Aerial view of the stadiums site, including the tailgating space. (Flintco)

McLane Stadium

Location:	Waco, Texas
Designer:	Populous, OJB Landscape Architecture
Client:	Baylor University
Year:	2014
Cost:	$266 Million

Overview

This project is a 45,000-seat football stadium on the north shore of the Brazos River.

This facility includes seven levels. Premium spaces in the facility include a 1,310-seat club area, Letter Winners Club, 72 loge boxes, 39 suites at the suite level, and six Founders' suites at the main concourse.

Included as part of the 93-acre development are new parking and tailgating facilities, RV parking, public walking trails, an intramural field, existing basin modifications and improvements, a new pedestrian bridge, a new bridge across the basin entrance, and campus improvements south of the Brazos River.

Figure 2-5 Aerial view. (Google Earth)

Figure 2-6 Foot bridge connecting spaces. (OJB Landscape Architecture)

Takeaway

• Designated tailgate spaces that are not parking lots, but more like parks.

• Utilizes its location and proximity to destinations around the stadium (in this case, campus, downtown, Brazos River, and existing pedestrian and bike paths) to create a destination that is not inconveniently located.

• The connection to campus via foot bridge gives visitors the feeling the facility is a part of campus.

• Open spaces on campus is also be utilized.

• The location by the water is recognized for the unique “sailgating” experience.

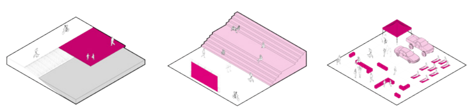

Figure 2-7 Bridge connecting tailgating area to the stadium. (Rod Aydelotte)

Figure 2-8 “Sailgating” before the game. (Rod Aydelotte, wacotrib.com)

Figure 2-9 A family enjoying a barbecue and the game day spirit at the tailgating space. (Jerry Larson, wacotrib.com)

Figure 2-10 The ADA ramp also doubles as a seating area. (AT&T Performing Arts Center)

AT&T Performing Arts Center:
Sammons Park

Location:	Dallas, Texas
Designer:	SmithGroup JJR, Michel Desvigne
Client:	AT&T Performing Arts
Year:	2009
Cost:	$33.5 million

Overview

This is a public space in the burgeoning Dallas Arts District. The design is an extension of the district's broader mission to provide visitors with access to outdoor amenities that open opportunities to experience art, music, history, and culture.

Formerly the site of a parking lot, the 10-acre park was designed in conjunction with the Winspear Opera House and Wyly Theatre to act as an entry plaza and outdoor performance space while connecting them to a neighboring high school and symphony center, serving as a spatial anchor for the district. The focus was on the use of water and shade to provide a comfortable environment for the users in a harsh Texas climate.

Figure 2-11 Aerial view. (Google Earth)

Figure 2-12 A place to relax in the city. (AT&T Performing Arts Center)

Takeaway

• Serves both as an entry and a courtyard for the programs around it, as well as a destination in its own right.

• Offers space for free yoga classes, performances, and other outdoor events and workshops.

• Provides shading in the harsh Texas climate.

• Converts a former parking lot space to a multi-functional habitable space.

• Mixes circulation and destination. (ADA Ramp)

• A space that complements different uses and programs surrounding it.

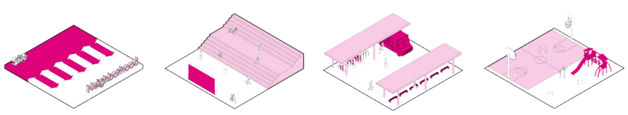

Figure 2-13 Stage for performances. (AT&T Performing Arts Center)

Figure 2-14 A space for yoga classes. (AT&T Performing Arts Center)

Figure 2-15 Children playing in the reflecting pool. (SmithGroup JJR)

Figure 2-16 Rendering of the tailgating space. (Home Depot/Atlanta Falcons)

Atlanta Falcons: Backyard

Location: Atlanta, Georgia
Designer: tvsdesign
Client: Atlanta Falcons
Year: 2018
Cost: $??

Overview
This addition will provide a 13-acre green space next to the Mercedes-Benz Stadium where the Georgia Dome previously stood (demolished on Nov. 20).

The space will provide areas for family activities, entertainment, and community events, and on stadium event days can serve as a fan tailgating zone. The overarching idea behind the park's creation was to create a community park that could host a variety of events, instead of a parking lot that could sometimes be used as a park.

Figure 2-17 Aerial view. (Google Earth)

Figure 2-18 Implosion of Georgia Dome. (AP Photo/Mike Stewart, AP Photo)

Takeaway

• Areas with designated tailgate spaces that are not parking lots, but function more as a park.

• A multi-use space that can be activated on non-event days at the stadium to host “arts and cultural events, entertainment, and community activities.”

• A space designed to avoid the disconnection of communities surrounding the stadium.

• A pavilion to engage game day audiences, and a picnic space for non- game days.

• Swaps the former parking lot and stadium spaces.

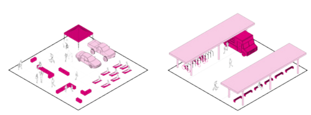

Figure 2-19 Entrance. (Home Depot/Atlanta Falcons)

Figure 2-20 A place to gather. (Home Depot/Atlanta Falcons)

Figure 2-21 A new experience of a multi-use stadium outdoor space. (Home Depot/Atlanta Falcons)

2.3 Connectivity

A stadium's accessibility and the degree of difficulty in getting to and from the location can influence—or even determine—a potential visitor's decision to make the trip to the site. Vehicular transportation has long been the most popular and convenient mode of transportation, and today it is evident that automobile traffic is what drives the design of our streets (Fig. 9). Designing thoroughfares for motor vehicles has improved the experience for drivers, but cyclists, pedestrians, and even small business owners along these streets have been shunted from roadways that were once places where people could spend time enjoyably. The language of such streets—wide roads, fast traffic, blank walls, and narrow sidewalks—has turned many people away from engagement with venues in these environments.[31]

Figure 2-22 Wide suburban streets are designed for vehicular transportation and not made to encourage active transportation.

Source: Federal Highway Administration.

[31] Shirley Secunda, et al., Streets as Places: Using Streets to Rebuild Communities, (New York: Project for Public Spaces, 2008), 5.

Before examining precisely what kinds of improvements can be made, we must understand what is causing such negative experiences for the users. Todd Littman, founder and Executive Director of the Victoria Transport Policy Institute, identifies the issues as follows:[32]

- quality of sidewalks, crosswalks, paths, bike parking, and changing facilities
- ease of road crossing protection
- network connectivity
- security
- environmental quality
- topography
- distance and accessibility
- attractiveness

In addition to the more obvious problems, Robert Cervero and Kara Kockelmen mention the “3Ds,” the three principal dimensions that influence travel demand: density, diversity, and design.[33] The pair says that, of the three variables, only density has been addressed, while diversity and design have been ignored.[34] In a more recent paper, Reid Ewing et al. examine the issue of whether or not streetscape features create more walkable streets that encourage

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[32] Todd Litman, *Land use impacts on transport: How land use factors affect travel behavior*, Victoria: Victoria Transport Institute, 2005 Accessed November 25, 2017, http://www.vtpi.org/landtravel.pdf.

[33] Robert Cervero and Kara Kockelman, "Travel demand and the 3Ds: density, diversity, and design," *Transportation Research Part D: Transport and Environment* 2, no. 3 (1997): 199.

[34] Ibid.

pedestrian activity. This paper incorporates three additional "D variables": destination accessibility, distance to transit, and demographics.[35] Our cities are becoming more complex, involving additional variables that also must be considered, which increases the challenge of implementing successful solutions.

Turning now to the issue of solutions, we can examine ways to improve individuals' experience of their journey. The idea of "complete streets" has become a popular concept in devising solutions to motor vehicles in automobile-centric America. The term "complete streets" emerged in 2003, thought up by America Bikes, a coalition of cycling organizations that were "developing a new policy initiative with the goal of ensuring the same rights and safe access for all users of streets, including pedestrians, bicyclists, motorists, and transit riders of all ages and abilities."[36] Many large cities have implemented this design concept into their policies, including Honolulu's complete street ordinance, which was adopted in 2012, and the Honolulu Complete Streets Design Manual finalized in 2016.[37] Because of the unique contexts present in each city, every complete street is intended to differ from the others, while the fundamental goals and elements remain the same. The goal is to create safer, healthier streets with increased mobility, with the additional benefit of reducing climate change-causing

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[35] Reid Ewing, et al., "Streetscape features related to pedestrian activity," *Journal of Planning Education and Research* 36 no.1 (2016): 5.

[36] Corey Zehngebot and Richard Peiser. "Complete Streets Come of Age. Learning from Boston and other innovators," *American Planning Association*, (2014), https://www.planning.org/planning/2014/may/completestreets.htm.

[37] "Honolulu Complete Streets," City and County of Honolulu, Last modified October 31, 2017, www.honolulu.gov/completestreets

emissions.[38] Elements of complete streets include travel lanes, parking lanes, bicycle lanes, sidewalks, off-street paths, crosswalks, loading zones, transit lanes, and other features.[39] One of the most lauded guidelines is the Boston Complete Street Design Guideline, winner of the Congress for New Urbanism New England Grand Award, the Institute of Transportation Engineers, Pedestrian and Bicycle Council Best Project Award, and now the National Planning Excellence Award for a Communications Initiative.[40] What stands out in this guideline is the way it communicates the three principles—being multimodal, green, and smart—using three-dimensional illustrations as well as photographs and an interactive website, making it clear and easy for the community to engage in this sphere (Fig. 10).[41]

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[38] Jeffrey Tumlin, *Sustainable Transportation Planning: Tools for Creating Vibrant, Healthy and Resilient Communities* (Hoboken: John Wiley & Sons, 2012), 46.

[39] Ibid., 46-47.

[40] "NATIONAL PLANNING EXCELLENCE AWARD FOR BOSTON COMPLETE STREETS DESIGN GUIDELINES," Toole Design Group, accessed November 23, 2017, http://www.tooledesign.com/resources/news/national-planning-excellence-award-boston-complete-streets-design-guidelines.

[41] "Boston Complete Streets," City of Boston, accessed November 23, 2017, http://bostoncompletestreets.org/.

Figure 2-23 A successful example of a Complete Street guideline.

Source: Boston Complete Streets.

Public transportation adds another layer to already complex transportation systems. Public transportation includes subways, commuter rail, light rail, streetcars, buses, shuttles, ferries, and any other “shared, publicly available transportation services.”[42] Making the multi-layer system work seamlessly is a major challenge, and the merits of such systems are often compared against the convenience of driving, but when properly implemented, the benefits outweigh the inconvenience. Furthermore, when people use public transportation, it also means that walking and biking (and possibly some driving) becomes a part of the experience. Transit Oriented Development is a wholesome package

[42] Jeffrey Tumlin, *Sustainable Transportation Planning: Tools for Creating Vibrant, Healthy and Resilient Communities* (Hoboken: John Wiley & Sons, 2012), 105.

incorporating all the above modes, an arrangement that offers “[m]ore compact, mixed, development designed around quality transit service, often designed around transit villages.”[43] Within these “transit villages,” walking, cycling, and the use of other forms of public transportation are encouraged, with the aim of supporting lifestyles that do not depend on automobiles.

Oftentimes, the experience of driving to events is unpleasant due to the strains of heavy traffic, costly parking fees, or even merely finding parking. However, in cases where spectators find the experience of using public transportation to be even worse, they will choose to drive. The precedents that follow are projects that focus not only on the experience at the venue but also on the experience of traveling to and from the venue using alternative modes of transportation.

[43] Todd Litman, *Land use impacts on transport: How land use factors affect travel behavior*, Victoria: Victoria Transport Institute, 2005, Accessed November 25, 2017, http://www.vtpi.org/landtravel.pdf.

Figure 2-24 Rendering of Stadium Plaza. (Waterfront Seattle)

Waterfront Seattle

Location:	Seattle, Washington
Designer:	Marshall Foster
Client:	City of Seattle
Year:	2023
Cost:	$688 Million

Overview

Waterfront Seattle is led by the City of Seattle's Office of the Waterfront under the motto "Waterfront for All."

One of their guiding principals for the project is "reconnection the city to its waterfront." The waterfront should act as a "front door" to the downtown neighborhoods and the city. It will feature a network of green connections and public spaces that connect visually and physically to the water, vital civic and commercial destinations, nearby neighborhoods and the larger fabric of downtown, and the city and regional open spaces. This will require a phased approach implemented over a longer horizon, but the full picture will need to remain in view from the beginning.

Figure 2-25 Aerial view. (Google Earth)

Figure 2-26 Rendering of the future Seattle waterfront. (Waterfront Seattle)

Takeaway

• Connectivity and multiple scales—city (including the bay), center city, and waterfront scale.

• City scale: transportation modes including ferry, light rail, and Amtrak. Connecting green spaces and activities around the city.

• Center City scale: connectivity of neighborhoods. Reconnecting both north-south and east-west streets.

• Waterfront scale: understanding the history of the site. Connecting land and water.

• Understanding of the multiple transportation elements: pedestrians, bicycles, transit connections, ferries, traffic and freight, and parking and local access.

• Designed for safe, comfortable, and efficient travel, especially for pedestrians and bicyclists.

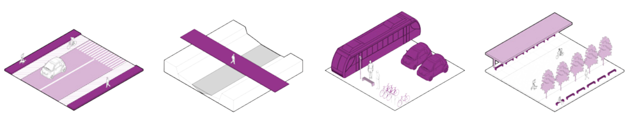

Figure 2-27 Passage section. (Waterfront Seattle)

Figure 2-28 Opening up spaces for pedestrians. (Waterfront Seattle)

Figure 2-29 Plan view of the schematic design of “Railroad Way” connecting the waterfront to the stadium district. (Waterfront Seattle)

Figure 2-30 Rendering of the new Perth Stadium and its surroundings. (Perth Stadium)

Perth Stadium

Location:	Burswood, Western Australia
Designer:	Cox, Hassell, HKS, Arup
Client:	Government of Western Australia
Year:	2018
Cost:	$2 Billion? ($350 Million for transportation)

Overview

The natural setting of green fields at the Perth Stadium site presents an opportunity to incorporate a pedestrian-focused movement network into the planning of the site, as opposed to retrofitting transport solutions after construction. The site is easily accessible by train, bus, and car (however, parking is limited), with opportunities for walking and cycling.

Because of the limited space for parking, the site was planned so that 83% of a capacity crowd can be transported by modes other than cars within one hour of an event.

New transportation improvements include a train station, a pedestrian bridge, and a bus facility.

Figure 2-31 Aerial view. (Google Earth)

Figure 2-32 The footbridge will be a new icon. (Perth Stadium)

Takeaway

• Priority is given to pedestrians, cyclists, and public transport over car use.

• Multiple transport mode options to divert game/ event day traffic.

• Direct walkable links between public transport facilities and the development.

• Inviting spaces to encourage pedestrians and cyclists.

• Cost of transportation will be included in event tickets.

Figure 2-33 More options on how to arrive to the stadium. (Perth Stadium)

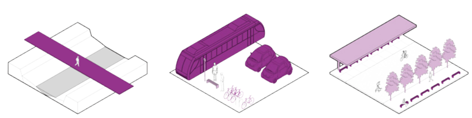

Figure 2-34 The bus terminal is located right by the stadium. (Perth Stadium)

Figure 2-35 Rendering of the new stadium train station. (Perth Stadium)

2.4 Ecological Design

The primary purpose of ecological design is to preserve or manipulate natural systems so as to improve functions of the built environment as human habitat. It is also defined as "any form of design that minimizes environmentally destructive impacts by integrating itself with living processes."[44] There are many layers and components to be considered in all biological, physical, and social systems, a requirement that can complicate the design. These systems do not necessarily have distinct boundaries, and oftentimes addressing ecological design requires one to think beyond the immediate boundaries and instead consider issues at a much larger scale.[45] We now realize that the Earth's natural environment has reached the point where it cannot be restored. The best way to address and coexist with nature is to design systems that foster resiliency in both natural and human environments.[46]

The very beginnings of the concept of ecological design can be traced back to Frederick Law Olmsted, who designed municipal parks around the United States to provide city residents with the benefits of nature.[47] During the environmental movement of the 1960s, Ian McHarg was one of the designers who brought ecological design to the forefront of landscape architecture. His design philosophy emphasized coexisting with nature rather than disrupting it. In his book "Design with Nature," he introduces the "overlay method," an ecological planning method using

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[44] Sim Van der Ryn and Stuart Cowan, *Ecological Design, Tenth Anniversary Edition* (Washington D.C.: Island Press, 2010), 33.
[45] Nancy Rottle and Ken Yocom, *Basics Landscape Architecture 02: Ecological Design* (United Kingdom: Ava Publishing, 2011), 14.
[46] Ibid., 16.
[47] Ibid., 22.

layers of maps and information to identify and locate the best possible option on site (Fig. 11). Other notable designers in the field include Michael Hough, Timothy Beatley, Charles Waldheim, and Mohsen Mostafavi. Michael Hough aimed to bring ecological ideas forward both intrinsically and physically, and by doing so promote systems that could actually contribute to our environment.[48] Timothy Beatley's work focuses on sustainable communities and development and on ways density can be increased while mitigating environmental impacts. In his book "Green Urbanism, Learning form European Cities," he mentions that "our old views of cities, towns, and communities are incomplete and must be substantially expanded to incorporate ecology and more ecologically responsible forms of living and settlement."[49] Charles Waldheim argues that the "building first" attitude that we exhibit must change, that landscape must be considered more fully in designing cities, and that open spaces (landscape) should be the driving tool used in building such cities.[50] Mohsen Mostafavi challenges the superficial idea of sustainability in urban design, saying that we should focus on quality more than the number of ecological concepts in design.[51]

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[48] Michael Hough, *Citis and Natural Process: A Basis for Sustainability 2nd Edition*, (London: Routledge, 2004).

[49] Timothy Beatley, Green Urbanism, *Learning form European Cities* (Washington D.C.: Island Press, 2000), 5.

[50] Charles Waldheim, *Landscape as Urbanism* (Princeton: Princeton University Press, 2106), 3-5.

[51] Mohsen Mostafavi, *Ecological Urbanism* (Baden: Lars Müller, 2010).

Figure 2-36 Example of layers of environmental factors.

Source: Ian McHarg, Design with Nature.

As the above makes evident, designers have been aware of the concepts of sustainable, green, and ecological design for some time. However, while these concepts have certainly come to comprise an aspect of the design process, much still remains in the realm of theory. The focus of environmental practices has developed more on the technological side, in areas such as energy production and conservation and use of materials, and less on the dynamic systems of the environment. As a result, certifications such as LEED (Leadership in Energy and Environmental Design) have become popular measures of determining whether or not projects address environmental practices. While such programs do bring a certain awareness to environmental issues, they are not necessarily integrated with the natural environment. Instead, environmental friendliness is evaluated by means of items on a checklist.

While applying such strategies can be challenging with a large structure and its surrounding space, some international projects have proven that such designs can be both functional and attractive at the same time. Allianz Arena, located in Munich, Germany, has its entire parking structure under a massive green roof promenade that connects the train station to the stadium. Although it is typically costlier to build underground than above ground, there were obvious visual and ecological advantages to doing so. The vegetation planted on this extensive green roof comprises local plants that require less maintenance, while dealing with water runoff in a cost-effective manner. For the London Olympic Park, one of the few Olympic facilities with a successful legacy, a former industrial landscape was transformed into a site benefitting both humans and wildlife. The project is another superb example of ecological design covering design principles such as vegetation and biodiversity, water management, resilience, and public health.

Figure 2-37 An extensive system was used to minimize additional loads from the green roof. (City of Munich)

Allianz Arena

Location: Munich, Germany
Designer: Herzog & de Meuron
Vogt Landscape Architects
Client: Allianz Arena
Year: 2001 – 2005
Cost: $??

Overview

The decision of having a green roof over the parking lot was because of the need to provide access for 70,000 fans arriving in different modes of transportation, reduce the heat island effect to get the building permit, and to deal with the storm water runoff.

To minimize additional loads from the green roof, they used a extensive system. The plants used for landscaping are local and low maintenance.

Figure 2-38 Aerial view. (Google Earth)

Figure 2-39 Native plants for sustainability. (Vogt LA)

Takeaway

• The Green roof is constructed of interwoven porous and nonporous substrates, installed flush with the ground for a seamless ground plane, and the drainage pipes are embedded in the substrate to channel excess water to the edge of the structure.

• The paths consists of porous lava substrate, allowing stormwater infiltration, retention, and vegetation growth.

• The integrated water retention design minimizes the need for a conventional drainage infrastructure.

• Reduction of peak water volume during rainstorm events prevents polluted run-off.

• Reuse of water allows vegetation growth and contributes to reducing the heat-island effect.

Liat Margolis and Alexander Robinson. Living Systems: Innovative Materials and Technologies for Landscape Architecture. (2007). Page 58.

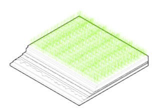

Figure 2-40 People walking to the stadium from the rail station. (Vogt LA)

Figure 2-41 Use of native plants simplifies maintenance. (Vogt LA)

Figure 2-42 The parking lot under the green roof. (City of Munich)

Figure 2-43 Aerial view rendering of the park. (Olympic Park Legacy Company)

Queen Elizabeth Olympic Park

Location:	London, England
Designer:	LDA-Design, Hargreaves Associates
Client:	London Legacy Development Corporation
Year:	2012
Cost:	Confidential

Overview

The design included the creation of spectator lawns and the largest wildflower meadow ever planted in the UK, contained within a sculpted topography that ensured all material was retained on site. The previously canalized River Lee was transformed into a three dimensional mosaic of wetland, swales, wet woodland, dry woodland and meadow, together forming an absorbent flood control measure.

There was a Biodiversity Action Plan in place as a part of their “green games” strategy. The authors of this action plan explored how biodiversity could be taken into account in the project to protect habitats and species.

Figure 2-44 Aerial view. (Google Earth)

Figure 2-45 Restored habitats on former post-industrial brownfields. (LDA Design)

Takeaway

• Replaced paving and sporting venues with park programming and additional habitat landscape.

• Plans such as the Biodiversity Action Plan and the Sustainable Development Strategy were set.

• Managing flood risk.

• Former uses of the site include oil refineries, chemical works, cold storage facilities, power stations, gas works, saw mills, back filled reservoirs, and warehouse/distribution centers.

• Planners were able to turn around the site, bringing back the green spaces and improving environmental and human health benefits at the site.

• Renewable energy sources.

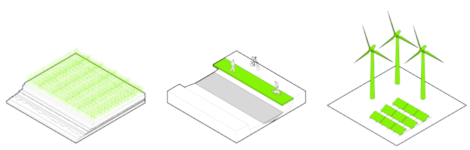

Figure 2-46 Diagram of different biozones. (Hargreaves Associates)

Figure 2-47 Gardens with a variety of plants. (Hargreaves Associates)

Figure 2-48 Left: Olympic Games Masterplan. / Right: Post Games Masterplan. (LDA Design)

2.5 Sea Level Rise and Flooding

As "climate" refers to typical weather conditions in an area, whatever the scale may be, from local to global, climate change occurs when there are "shifts in the mean state of the climate of its variability that persists for a long time (at least several decades)."[52] Climate change has occurred naturally in the past (i.e., in ice ages), but today, 97% of those scientists who have published papers on climate change agree that current climate change is caused by human activities that are polluting the atmosphere and, as a result, altering the balance of this complex system.[53] Today we see the expression "climate change" in many different contexts, including media reports stating that natural disasters are possibly caused or amplified by the effects of climate change, politicians addressing the issue as part of their agenda, and even in daily life. Despite denials by some, it has become an unavoidable challenge that we must face.

One of the effects of climate change is rising global surface temperatures, which lead to a rise in sea levels, consequentially causing tremendous damage to sea life while simultaneously altering ecological dynamics and impacting coastal cities, thereby increasing their vulnerability to extreme weather events. The increase in extreme weather events in recent years is overwhelmingly considered to be due to climate change. Just this past summer, Hurricane

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[52] Bruce Glavovic, Mick Kelly, Robert Kay, and Ailbhe Travers, eds. *Climate Change and the Coast: Building Resilient Communities* (Boca Raton: CRC Press, 2015), 4.
[53] John Cook, et al., "Consensus on consensus: a synthesis of consensus estimates on human-caused global warming," *Environmental Research Letters* 11, no. 4 (2016): 7. DOI:10.1088/1748-9326/11/4/048002

Harvey broke records with historic level of rainfall and massive flooding in the Houston metropolitan area, and Hurricane Irma caused flooding and damage in locations in and near the Caribbean Sea, including the U.S. Virgin Islands and Florida, while Hurricane Maria left millions of Puerto Ricans without fresh water and electricity. All of these disasters displaced millions of people from their homes, forcing them to stay at shelters for extended periods. In the past, stadiums, arenas, and convention centers with the ability to accommodate large numbers of people would, following such events, be used as evacuation centers. The challenge is that these facilities are not designed for an extended occupation, so conditions inside very quickly turn unpleasant (Fig. 12). With an increasing number of extreme weather events expected in the future, it is crucial that we consider site capabilities and flexibility in transforming stadiums into shelters as a central matter in their design.

Figure 2-49 Inhumane conditions at the Superdome after Hurricane Katrina.

Source: Michael Appleton, Getty Images.

Rises in sea level can also cause many kinds of change, for example impacting the water table: "The coastal groundwater table, which rises and falls with the daily tides, will crop out above ground level creating new wetlands, changing surface drainage, and producing widespread flooding especially when high tide is coincident with heavy rainfall."[54] Physical effects caused by sea level rise can be categorized as inundation, erosion, salt intrusion, and drainage problems; in coastal cities, all of these could apply simultaneously, which could worsen consequences even further.[55] The result could very well be major damage to critical infrastructure—transportation, water, energy, and communications. When Hurricane Sandy hit New York City in 2012, the "storm surge occurred near the time of high tide… contribut[ing] to record tide levels" and putting parts of the city under several feet of water, bringing the total estimated damage up to 19 billion dollars (Fig. 13).[56] The above combination of factors made Sandy the second-costliest cyclone since 1900.[57]

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[54] "Sea Level Rise Hawaii," University of Hawaii, School of Ocean and Earth Science and Technology Coastal Geology Group, accessed November 29, 2017, http://www.soest.hawaii.edu/coasts/sealevel/index.html.

[55] Ibid.

[56] "Tropical Cyclone Report Hurricane Sandy," National Weather Service, accessed November 29, 2017, http://www.weather.gov/okx/hurricanesandy

[57] Ibid.

Figure 2-50 Blacked-out New York City after Hurricane Sandy hit.

Source: Iwan Bann, New York Magazine.

Even without this layering of weather event effects, severe damage still can occur in coastal cities such as those in Hawai'i, surrounded as it is by the ocean. Although not as extreme as in the examples above, Hawai'i has been experiencing increasing instances of nuisance flooding during the king tides—a stacking effect of high tide and high surf—because of sea level rise. Until recent years, king tides were never an issue. During the king tides in the summer of 2017, however, the flooding affected roads, highways, and businesses as well as beaches, leaving beachgoers nowhere to place their towels.

When designing for climate resiliency, there are several adaptation strategies to be considered. Some of the categories include barriers (e.g., Maeslant Barrier in the Netherlands), coastal armoring (e.g., super levees in Japan), elevated developments (e.g., elevated houses in New Orleans), floating developments (e.g., floating canal houses in Amsterdam), floodable developments (e.g., Smale Riverfront Park in Cincinnati), and living shorelines (e.g., Living Breakwaters in Staten Island) (Fig. 14). Every strategy has its particular advantages and disadvantages and must be studied carefully before being implemented anywhere. The precedent studies here will focus on projects that are in close proximity to a stadium and address the issue of sea level rise and flooding.

Figure 2-51 Example projects in each category of coastal intervention.

Source: From top to bottom, left to right. CBS News. William Veerbeek, Flickr. Sid Hamm, Photography-Panorama Photos. Samuel Ludwig, Flickr. J Miles Wolf, Cincinnati Design Awards. SCAPE.

Figure 2-52 The park is situated in between two stadiums, downtown, and the river. (Sasaki Associates)

Smale Riverfront Park

Location:	Cincinnati, Ohio
Designer:	KZF Design, Sasaki Associates
Client:	Cincinnati Park Board
Year:	2008-15
Cost:	$120 Million

Overview

Multiple outdoor spaces bring people from the community to relax and play. With the different types of amenities, people of all ages can enjoy the park.

Spaces are also used to hold events independently, and there is constant foot traffic in the area, not only when there are games. This also provides a mutual connection between downtown and the water.

The floodplain was studied carefully and designed with detail. The hard scape and building amenities were raised above the floodplain with floodable parking underneath. The lawn and certain outdoor playground areas were placed closer to the water in areas that can withstand flooding.

Figure 2-53 Aerial view. (Google Earth)

Figure 2-54 1997 flooding. (Ernest Coleman, news.cincinnati.com)

Takeaway

• Embraces rather than resists the fact that the park is on a flood plain.

• Programs with hard infrastructure are on elevated plains, while others such as parking lots and playgrounds become floodable.

• It is possible to design a large area that is not merely passive open space in which there is nothing but space. Many programs do not require hard infrastructure to function as an active public space and still be floodable.

• Keeping the floodable areas porous also helps reduce flood damage.

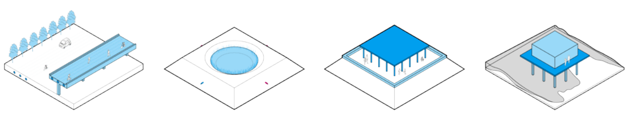

Figure 2-55 Play spaces in the flooding plain. (KZF Design)

Figure 2-56 Floodable parking lot. (Randy Simes, urbancity.com)

Figure 2-57Plan and section of floodable areas. (Sasaki Associates)

Figure 2-58 Artist's impression of AT&T Park in 100 years if sea levels rises by 5 feet. (Nickolay Lamm)

Sea Level Rise Adaptation Study
Mission Creek

Location:	San Francisco, California
Designer:	Arcadis US, Inc., CallisonRTKL, Wageningen University and Research Centre
Client:	San Francisco Bay Area Planning and Urban Research Association
Year:	2016
Cost:	$??

Overview
San Francisco is a city vulnerable to the impacts of sea level rise, and one of the lowest lying parts of the city is the area surrounding Mission Creek on the eastern waterfront. San Francisco is already experiencing flooding from extreme tides and rain.
The "Mission Creek Sea Level Rise Adaptation Study" explores design concepts for the future using hard and soft interventions including levees, seawalls, tidal barriers, dams, and elevated streets.

The project's goal is to propose design concepts for a future neighborhood with reduced flood risk, raising public awareness by illustrating what could well occur, and demonstrating that it is a real problem.

Figure 2-59 Aerial view. (Google Earth)

Figure 2-60 Sea Level Rise Map. (SPUR)

Takeaway

• There are many different ways of adapting to sea level rise: soft or hard, mono-function or multi-function, near-term or long-term, etc.

• Understanding the problem and identifying where and what is vulnerable is key. This will inform evaluation of the advantages and disadvantages of each intervention.

• There is no easy way to implement any of the interventions, but decisions need to be made quickly. Sea level rise is accelerating.

• The design process of adaptation planning itself will require engaging many stakeholders.

• The interventions must be adaptable.

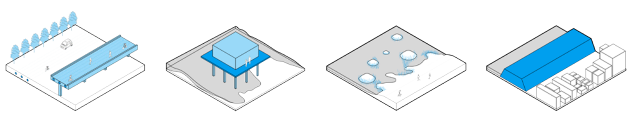

Figure 2-61 Option 1: Raising the vulnerable low spots. (SPUR)

Figure 2-62 Option 2: Construct a tidal barrier. (SPUR)

Figure 2-63 Option 3: Closing off from the bay at the mouth of the creek with a levee or dam. (SPUR)

2.6 Stadium Reuse

In environmental design, the concept of adaptive reuse is commonly applied at various different scales, and not just with stadiums. Although this practice may have existed in the past, it has become more common to redesign or reuse the existing structure when for various reasons there is an option to do so. There are several definitions such as "process by which structurally sound older buildings are developed for economically viable new uses,"[58] which involves narrowing down candidate reusable buildings to those that are structurally sound, as well as more general definitions that may be as broad as "converting a building originally designed for one purpose to an economically viable new purpose."[59] The overall definition may suggest that in bringing a whole new meaning and use to a structure, the cultural significance and heritage is often preserved in the new design. Just as with any other architectural trend, meaning and practice have evolved and will continue to do so. With the shortened lifespan and use of structures, we must acknowledge possible uses in the future when we design today.

One of the reasons adaptive reuse has become more common is that sustainability concerns are making it more difficult to justify demolishing structures (especially when there is a cultural or historical significance and/or a

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[58] Richard Austin, et al., *Adaptive Reuse: Issues and Case Studies in Building Preservation* (New York: Van Nostrand Reinhold Company, 1988), 49.
[59] Jo Allen Gause, et al., *New Uses for Obsolete Buildings* (Washington, D.C.: Urban Land Institute, 1996), v.

large footprint).[60] If the structure is no longer required and is suitable for uses needed in the area, the decision to adapt and reuse, when compared to new construction, can save time, money, and resources. This can be relatively simple when the original structure is designed for flexible use or features an open plan layout. For example, the Pallotta TeamWorks headquarters designed by Clive Wilkinson Architects was a project in which they used shipping containers in converting a warehouse with a large open floor plan into offices requiring smaller spaces (Fig. 15). Another example is the Tate Modern—a modern art gallery—that was originally an electricity power plant called Bankside Power Station (Fig. 16). Although both structures were built for a specific use, the simple, flexible plans allowed for a smoother transition. How will adaptive reuse work in stadiums?

Figure 2-64 Offices of Pallotta TeamWorks headquarters.

Source: Clive Wilkinson Architects.

[60] Nuran Mengusoglu and Esin Boyacioglu. "Reuse of Industrial Build Heritage for Residential Purposes in Manchester," *METU Journal of the Faculty of Architecture* 30, no.1 (2013): 117.

Figure 2-65 Before and after of the Bankside Power Station and Tate Modern.

Source: Tate.

The idea of reusing stadiums is a fairly new development, and not many adaptive reuse projects have actually been built. A stadium’s dedicated function, design, and size make this rather complicated. One extreme example of a process similar to the previous examples of fitting a smaller program into a larger one is seen in Osaka Stadium, once the home of the Nankai Hawks baseball team. When the team was sold and moved to another city, this stadium housed an outdoor display for model homes—and at one point even a temporary theater for the musical “Cats.” This is a rare example among adaptive stadium reuses, and not the most successful one (Fig. 17). Other examples of such stadiums and arenas include Highbury Square (soccer), Stadium Lofts (baseball), and Las Arenas (bullfighting). In the first two examples, the facilities were reused as apartments, and in the third one, a mall. All were successful with their new functions. What differentiates the latter example from the others is that while the façade was preserved, most of the structure was either brand new or reinforced. Providing a new function to the existing space has been the biggest challenge.

Figure 2-66 Osaka Stadium when it had the model housing display and a temporary theater.

Source: jiji.com.

Adaptive reuse may not always be the answer, but it is still a more sustainable option then merely demolishing the structure, even if the material is recycled. Studies show that recycling the material upon demolition can reduce environmental impact by preserving landfill capacity and decreasing the carbon footprint, producing a closed-looped design model, as compared to a linear design model were the material to end up in a landfill. For example, the recycling process for Candlestick Park— the former home stadium of the San Francisco Giants (baseball) and 49ers (football)—

started with stripping out the seats and non-recyclable materials.[61] The structure was then demolished and the different materials sorted for recycling.[62] It was reported that in this particular case, about 98% of the rubble from the demolition was recycled.[63] Another example is the Hubert H. Humphrey Metrodome, a former Minnesota Vikings stadium, which underwent a similar process, with recycling of over 80% of the material, including some of the material used in building the new stadium.[64] In Hawaiʻi, even though materials are sorted for recycling, getting that material to a facility capable of processing them can become a problem, as it would have to be shipped off the island, a significant addition to the carbon footprint. Therefore, this option should be examined very carefully to determine whether or not it is actually sustainable.

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[61] Matt Franzel, "Candlestick Park Recycles 98% of Materials on Demolition Project," ForConstructionPros.com, December 9, 2015, https://www.forconstructionpros.com/sustainability/article/12118845/candlestick-park-in-san-francisco-recycles-98-of-materials-on-demolition-project.

[62] Ibid.

[63] Ibid.

[64] Minnesota Sports Facilities Authority, "More than 80 Percent of Metrodome to be Recycled as Demolition Continues on Schedule." March 19, 2014, http://www.msfa.com/content/PRESS%20RELEASES/METRODOME%20DEMO/Demo%20update%203%2019%2014.pdf.

Figure 2-67 Central courtyard, where the field used to be. (CJ Swinland)

Highbury Square

Location: London, England
Designer: Allies and Morrison, Christopher Bradley-Hole Landscape
Client: Highbury Holdings Ltd
Year: 2009
Cost: $120 Million

Overview

Arsenal Stadium was a football stadium, previously the home ground of the Arsenal Football Club. When the club built a new stadium, this facility was no longer going to be used. The stadium had a capacity of 38,419 (peak of 73,000 at closure) and a field size of 109×73 yards (100×67 m).

The site was transformed into a residential community. Much of the actual stadium was demolished, with the original facade preserved due to the community's attachment to it. The large plot was divided into smaller sections, leaving a large central courtyard. Although it is not of the scale as its surroundings, the configuration of the structures simulates the residential typology of the neighborhood.

Figure 2-68 Aerial view. (Google Earth)

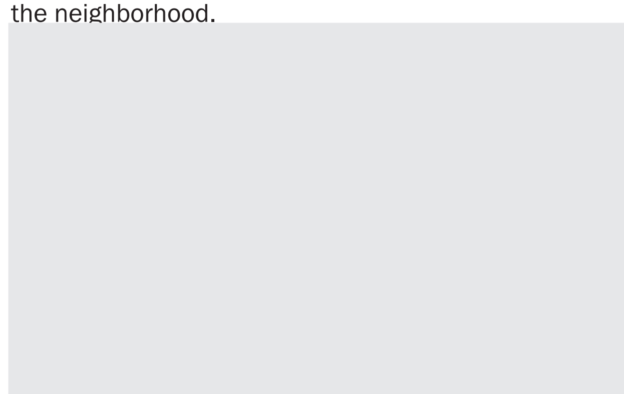


Figure 2-69 Arsenal Stadium. (The Arsenal Football Club)

Takeaway

• Historic and iconic values of the building were kept intact by preserving the facade. Keeping the facade was important for a surrounding community that loved the building.

• Although the size of the structure remained unchanged, the designers were successful in connecting the surrounding community by creating access points to the inner courtyard.

• Design of the courtyard results in an overall typology that mimics that of its surrounding neighborhood.

• Transforming to a more human scale—or to a scale that matches its surroundings—was a must.

Figure 2-70 Sections before and after. (Allies and Morrison)

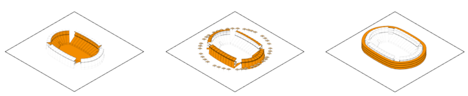


Figure 2-71 The preserved facade. (CJ Swinland)

Figure 2-72 View of the preserved stands from the courtyard. (National Center for Preservation Technology and Training, National Park Survives)

Figure 2-73 Rendering of the reused stadium. (Develop Indy)

Stadium Lofts

Location:	Indianapolis, IN
Designer:	Unknown
Client:	Core Redevelopment
Year:	2013
Cost:	$13 Million

Overview
Opened in 1931, Bush Stadium was a popular minor league park for decades, but was abandoned in 1996.

The Art Deco stadium once served the purpose of housing old cars from a federal “Cash for Clunkers” program before it was reused as apartments.

The Stadium Lofts comprises more than 130 apartments in a stadium structure in which key features such as the ticket booth and owner’s suite were preserved. The three-story brick and steel structure has plenty of oddly-shaped apartments and features views looking out onto the field.

Figure 2-74 Aerial view. (Google Earth)

Figure 2-75 The abandoned stadium before reuse. (Ken Honeywell, Punchnel’s)

Takeaway

• An example of a stadium that was reused in the United States.

• Reuse does not have to be limited to the building. In this example reusing the seats from the old stands as benches around the property was a playful move.

• The project missed an opportunity in reusing only the built structures, but not the field. Especially with a residential project, surrounding spaces must be looked at for the longevity of the new program.

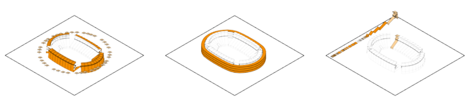


Figure 2-76 Rooms have a view of the field. (Apartments.com)

Figure 2-77 Entrance to the apartments. (Apartments.com)

Figure 2-78 View from the field. (Apartments.com)

Figure 2-79 The bull ring becomes a new icon for the city with a new function. (Arenas de Barcelona shopping and leisure center)

Arenas de Barcelona

Location:	Barcelona, Spain
Designer:	Alonso y Balaguer, Richard Rogers
Client:	Sacresa/Metrovacesa
Year:	2011
Cost:	$150 Million

Overview

The former Las Arenas bullring was built at the end of 19th century, but came to be neglected after bullfighting lost popularity and eventually was banned. The facility is now reused as a major new mixed-use leisure, entertainment, and office complex. The facade of the old structure was preserved, maintaining the historic/iconic value while giving it a new purpose.

The highlight of the intervention is the 100-meter diameter “dish” with a 76-meter diameter domed roof floating over the historic facade, which is structurally independent from the rest of the building. The sky-walk provides new entertainment in a city that was lacking it, transforming the structure into a 21st-century icon.

Figure 2-80 Aerial view. (Google Earth)

Figure 2-81 Historical photo of the construction. (El País)

Takeaway

• Historic and iconic values of the building were kept intact by preserving the facade.

• Activating the community through reusing a building that was underutilized, but also giving a new identity through programming and additional features.

• Adding a key feature (the sky-walk) brought new attractions to an area where they were very much needed.

• Reuse of a structure need not involve concerns regarding whether or not the design fits into the neighborhood.

• Designers should listen to the needs of the community.

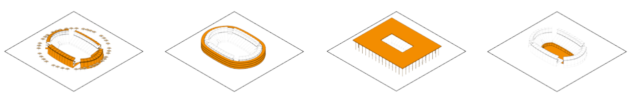


Figure 2-82 The sky-walk. (Arenas de Barcelona)

Figure 2-83 Plenty of flexible space under the dome. (Arenas de Barcelona)

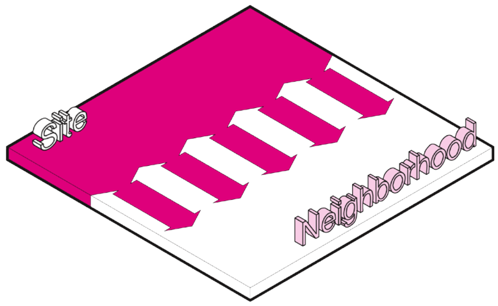
Figure 2-84 The lower levels were reused as a shopping mall. (Arenas de Barcelona)

2.7 Key Principles

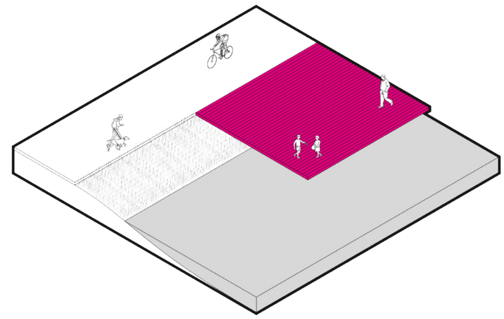
In each category, literature reviews and precedent studies have provided a basic knowledge of the development of theories and practices that have proved to be successful. Because of the specific typology of stadiums with the scale much larger than many building types, not all theoretical ideas were directly applied into design. Precedents explored in this section were successful examples of how these principles were translated into each specific scenario. While none of the precedents studied in this section involves a location as remote as Hawai'i is, there are relevant strategies that could be applied as key design principles.

The following diagrams are a visual summary of design practices that were demonstrated in literature and precedents that are applicable to the redevelopment of Aloha Stadium. These principles will later become a part of the framework for designing the new proposal, and the components to compare the three proposals.

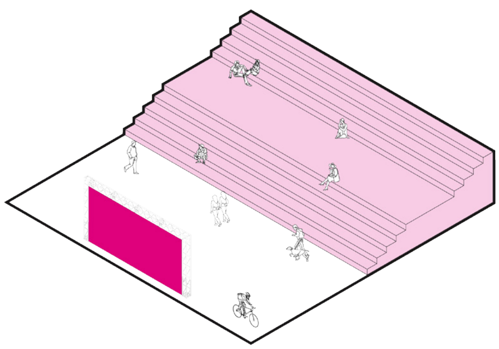
Public Space



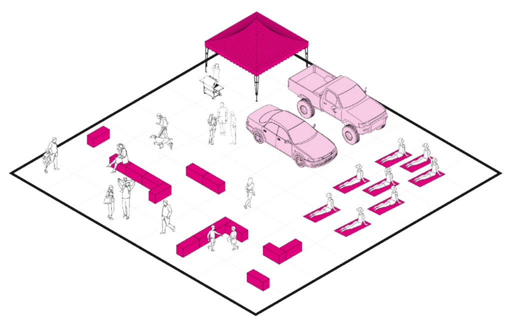
Connection With Neighborhood



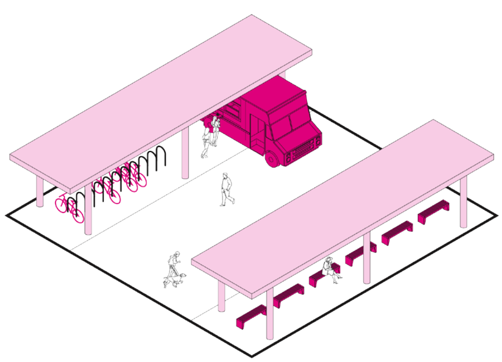
Nature



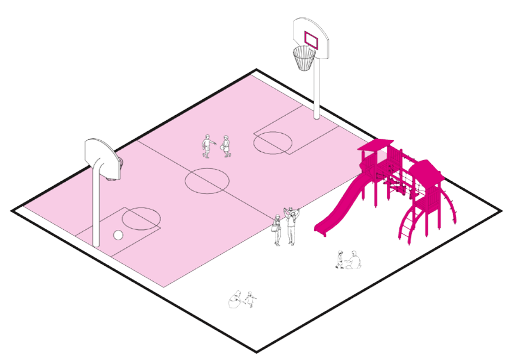
Gathering Space



Multi-Purpose Parking Lot



Covered Space



Playground

Figure 2-85 Public space principals.

Connectivity

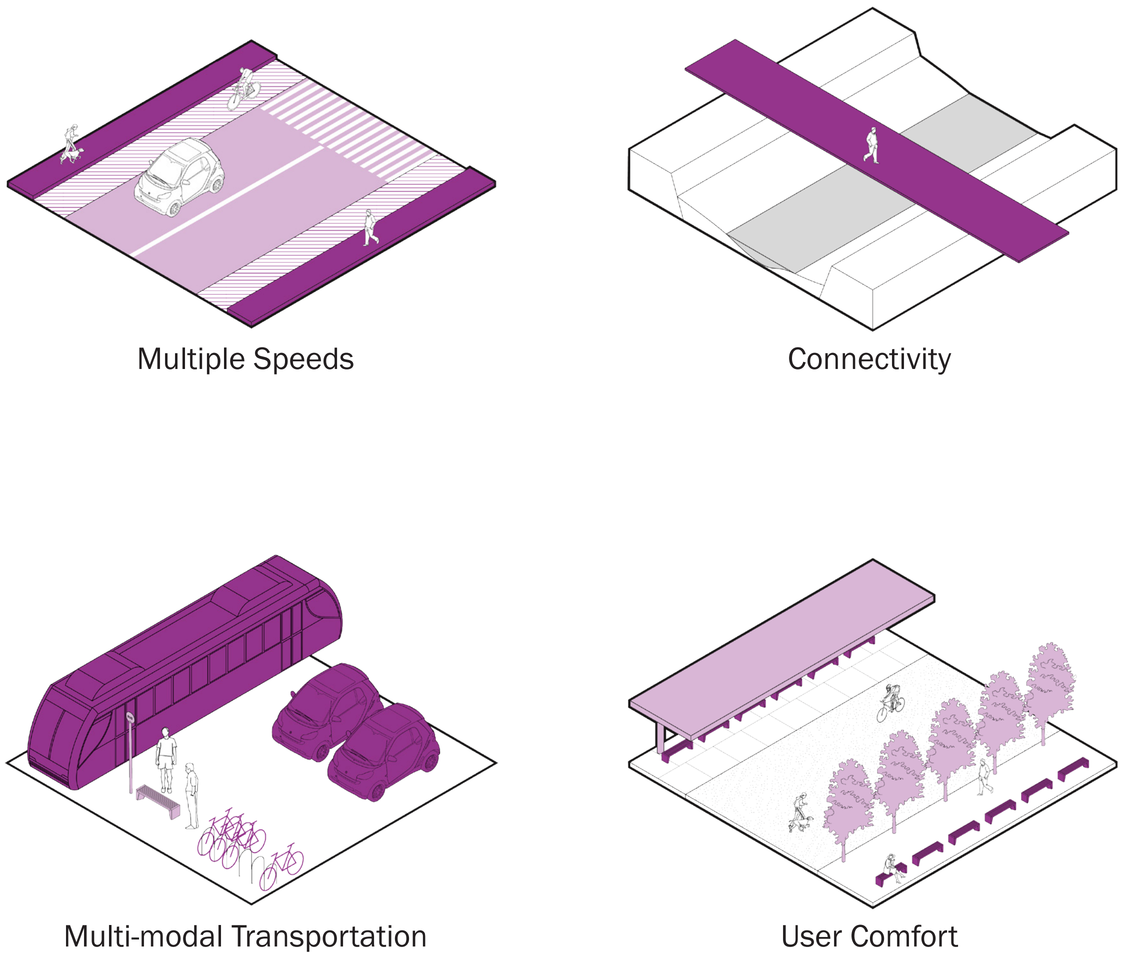
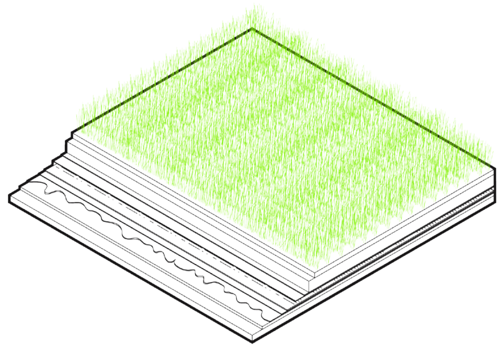
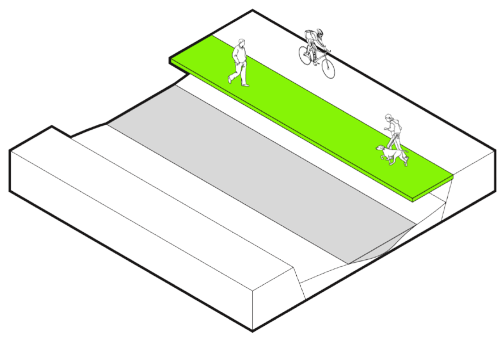


Figure 2-86 Connectivity principals.

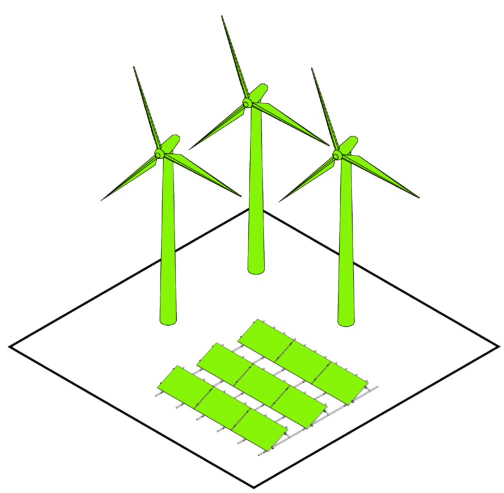
Ecological Design



Ecosystem Services



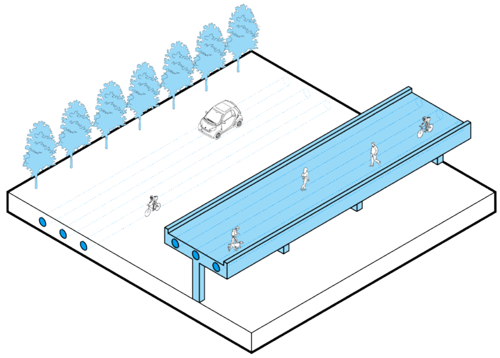
Activate Water Resources



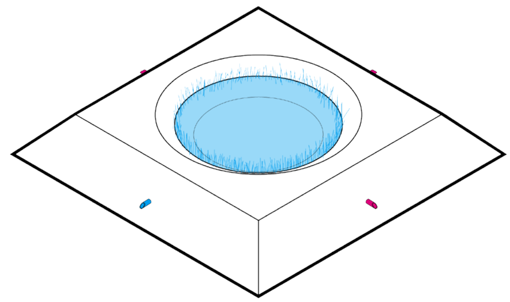
Clean Energy

Figure 2-87 Ecological design principals.

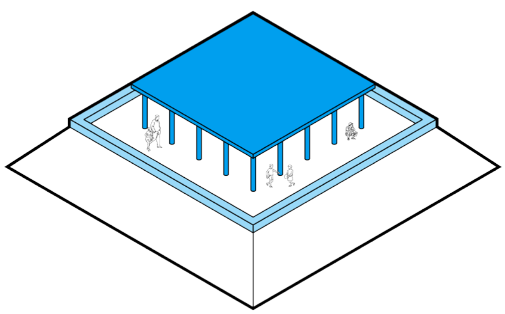
Sea Level Rise and Flooding



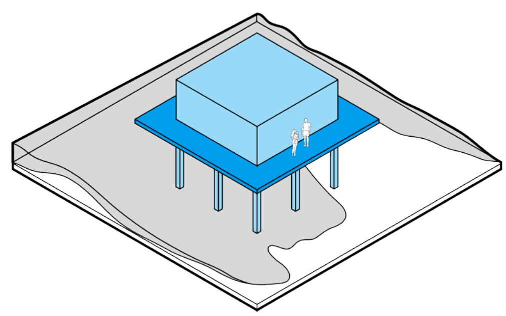
Infrastructure Management



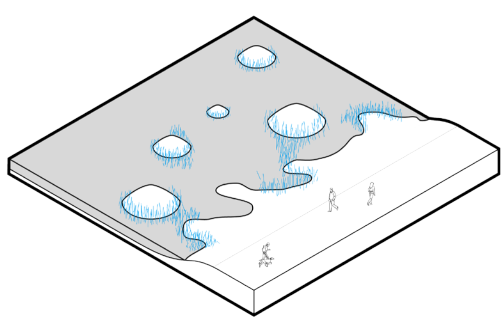
Water Management



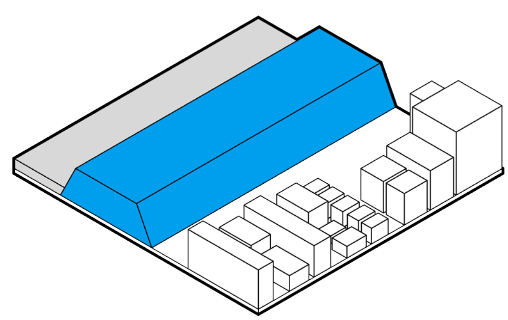
Shelter



Floodable Design



Soft Defense



Hard Defense

Figure 2-88 Sea level rise and flooding principals.

Stadium Reuse

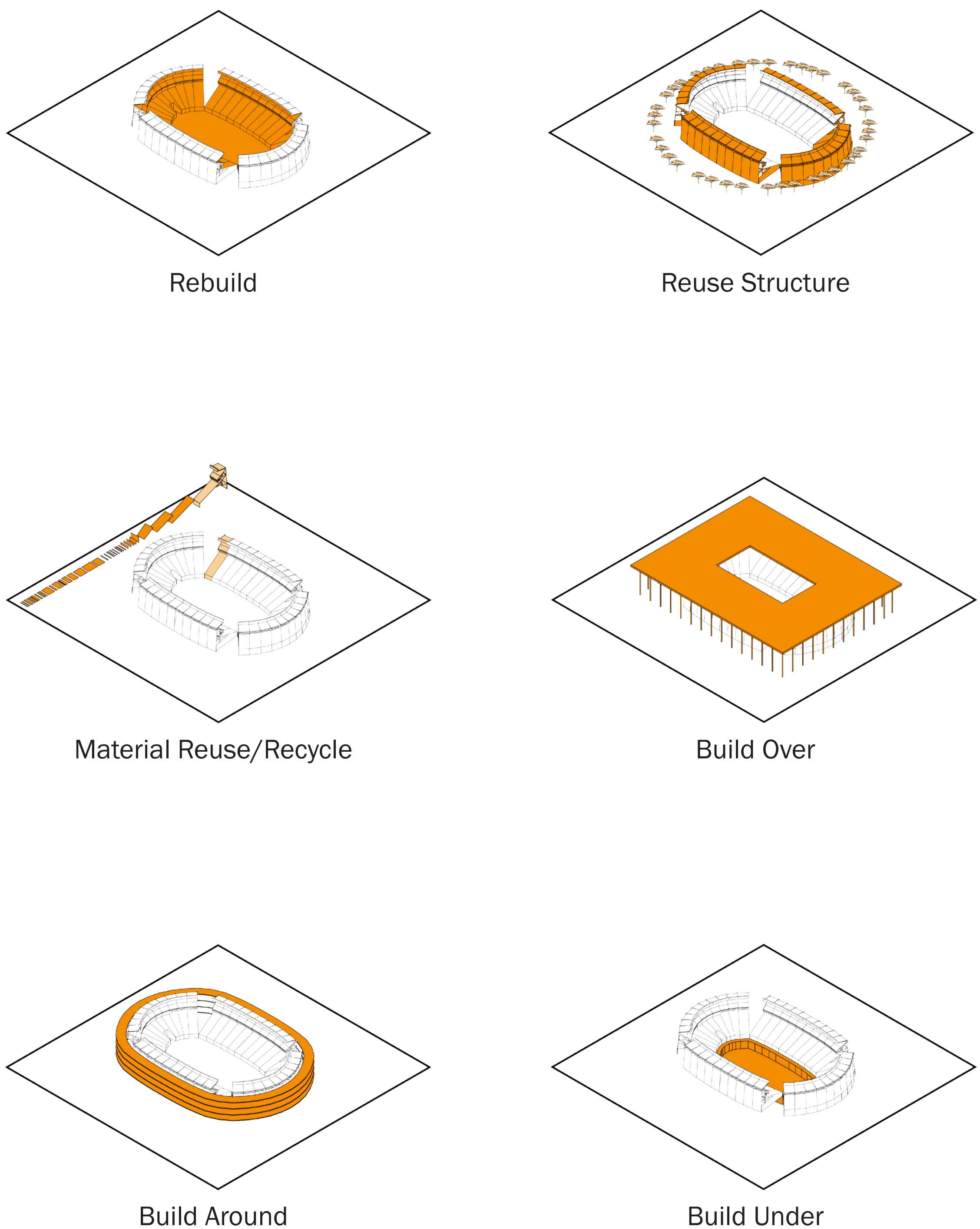


Figure 2-89 Stadium reuse principals.

2.8 Going Forward

While current plans for the future of Aloha Stadium apply certain key components related to the areas explored in this chapter, plans will further benefit from a more profound consideration of design principles and knowledge gleaned from precedents. These extra layers of examination and analysis will enable the site not only to function well within its boundaries but also to reach out and connect with the surrounding community and ultimately, urban Honolulu. The challenge now will be how to integrate the principles to the site in a meaningful manner. The next chapter will narrow the focus to Aloha Stadium's history, current conditions, and context, as well as the current proposals, to identify qualities that are not included in existing proposals and the improvements that need to be made.

3. Aloha Stadium

3.1 Aloha State's Iconic, Aging Venue

Although hosting many events since its doors first opened, Aloha Stadium has suffered a declining reputation in recent years, while upkeep of the facility continues to be a drain on state resources. Nonetheless, Aloha Stadium is unique in that it is one of the very few stadiums owned and operated by the state, in addition to being the only stadium of its size in an environment as remote as the mid-Pacific Ocean. This chapter will examine the existing conditions and uses of the stadium as well as the Transportation Oriented Development Plan, the Aloha Stadium Conceptual Development Report, and other development plans that affect the area, then analyze the information to determine the opportunities and constraints of the site.

3.2 Existing Conditions and Urban Context

In order to improve the stadium and its surrounding environment, it is critical to understand the current situation, including site and social analyses, use, corrosion reports, relevant history, possible environmental issues, and other issues that may be factors in developing a new plan.

3.2.1 Location and Population

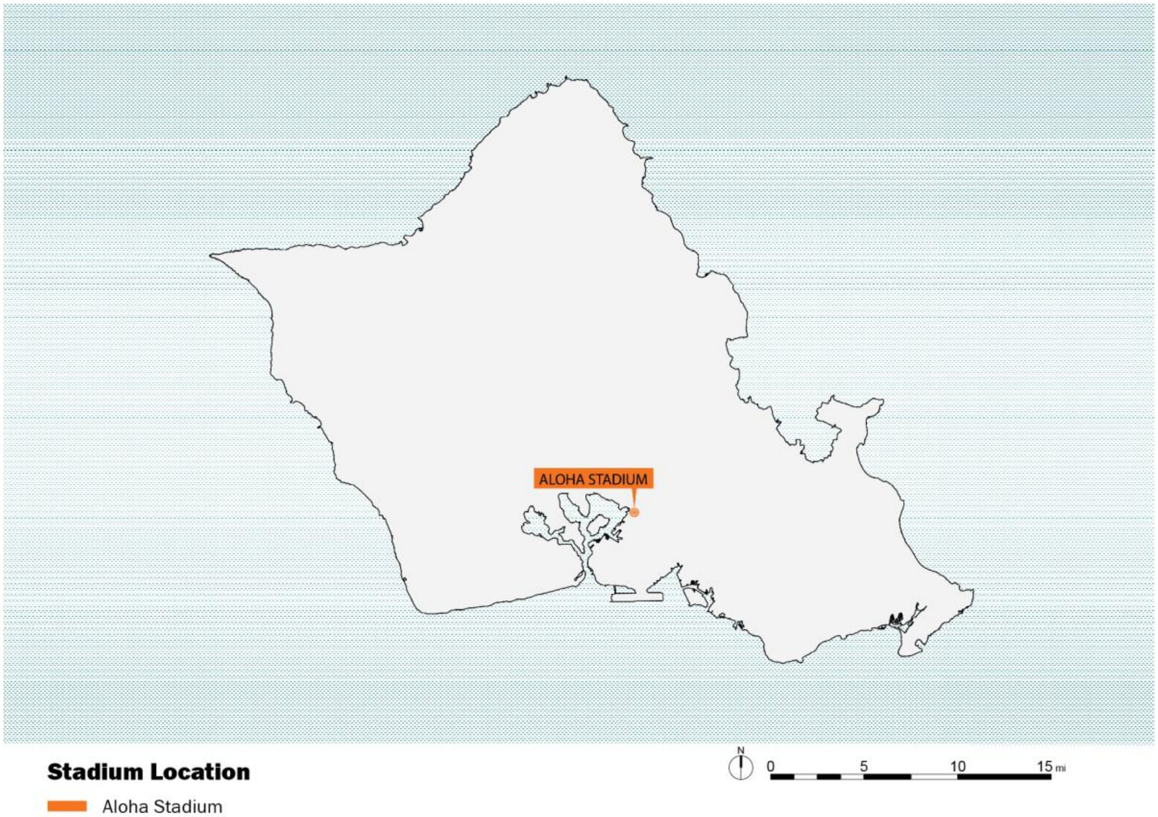


Figure 3-1 Stadium location.

Source: State of Hawaiʻi (Coastline). Graphic: By Author.

The stadium is located in the City and County of Honolulu, either in Halawa (Census Designated Place, CDP) or Ewa (Census County Divisions, CCD), depending on which of the different ways the island is divided one uses. Although it is not in an area of the City of Honolulu where any significant portion of the population is concentrated, it is located just right outside such an area. It is also included in the Honolulu Metropolitan Statistical Area, which is defined by the U.S. Office of Management and Budget and is included in the Primary Urban Center for Oahu's development plans and sustainable communities plan areas (Fig. 19). In terms of the island's ancient Hawaiian divisions, the stadium sits in the Moku of Ewa, and the Ahupuaa of Halawa.

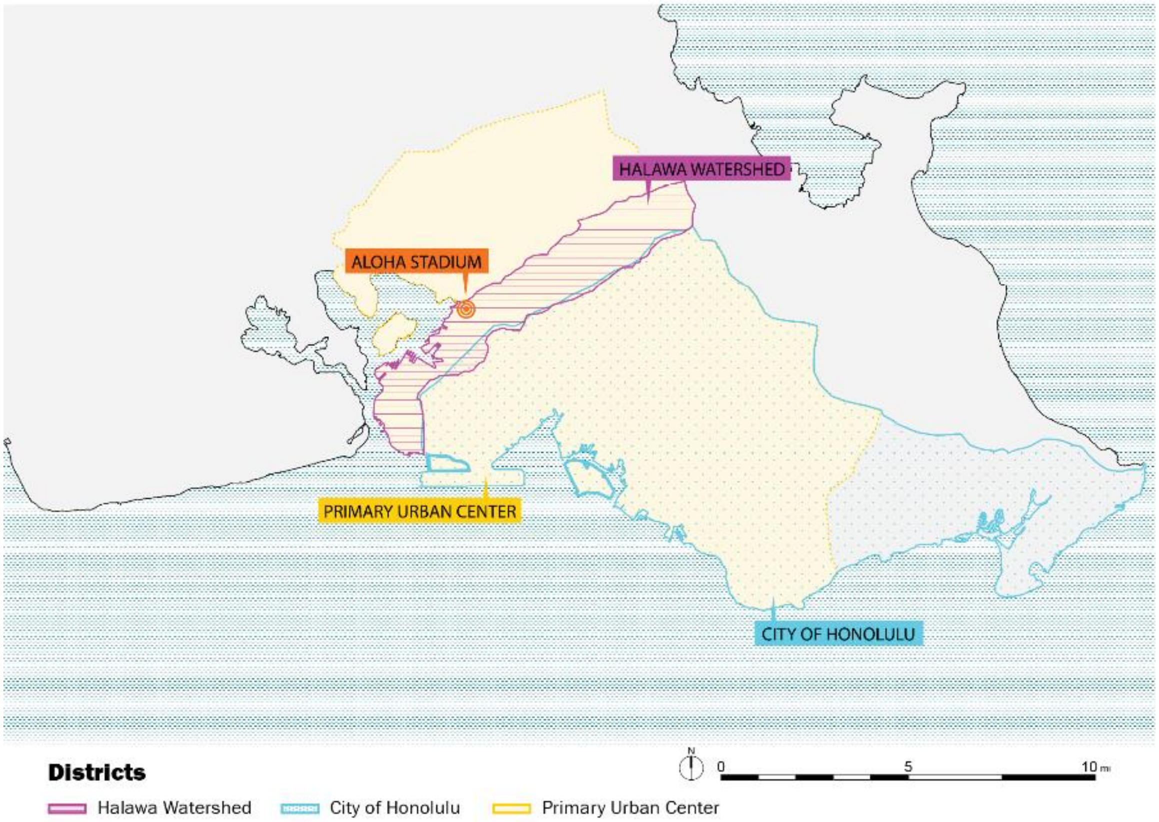


Figure 3-2 Stadium location and land division.

Source: State of Hawaiʻi (Coastline, Watersheds), City and County of Honolulu (Primary Urban Center Development Plan), Google Maps (City of Honolulu), Graphic: By Author.

This stadium location could present an opportunity, as it is situated between the urban core of Honolulu, where the tourists concentrate, and the living quarters of the locals in West Oahu. On the other hand, that same set of factors may turn out to be the challenge, since for the most part, this is usually not a destination itself, but rather an area that most people pass by.

According to the U.S. Census Bureau, the population of Halawa is 14,014, thus constituting only about 4.2% of urban Honolulu's population of 337,256. The age distribution is 22% under 18 years of age, 62% age 18-65, and 16% over 65 years old. These figures closely match the averages for Honolulu County. Almost half of the population is Asian and 21% Caucasian/White, while 19% are of 2 or more ethnic groups. The median household income is $91,779 (in 2015 dollars), with 36.2% of the homes occupied by renters, whereas the median income in urban Honolulu is $61,442 (in 2015 dollars), with 57.2% of the homes occupied by renters. [65]

What the information above indicates is that the population living in the surrounding communities consists mostly of well-established middle-class residents who own their own homes, and who have above-average incomes as compared with the average of the island. Although this is what the statistics indicate for the neighborhood, there are also residents in low-income households who must not be ignored. How can we design a space everyone can benefit from when catering to such a wide range of groups and individuals?

3.2.2 Land Use, Zoning, and Property Ownership

Halawa features three dominant types of land use—residential, commercial, and military use—while the state-designated land use is urban. The stadium is located on differing urban boundaries. As mentioned in the previous section, Halawa lies between Urban Honolulu and West Honolulu, between military and residential areas, and between the water and the Koolaus. Residential use is typically low- to medium-

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[65] U.S. Census Bureau, 2010 Census Data, "QuickFacts Halawa CDP, Hawaii; Hawaii," accessed October 19, 2017, https://www.census.gov/quickfacts/fact/table/halawacdphawaii,HI/AGE275210.

density, with the density of apartments and condos increasing with closer proximity to Pearl City. Military housing situated on federal land is located toward the south of the stadium. Commercial centers within the various local neighborhoods are of smaller scale, with the exception of the Pearlridge Shopping Center, the second largest mall after the Ala Moana Shopping Center. The Military has a strong presence with the Joint Base Pearl Harbor-Hickam to the south.

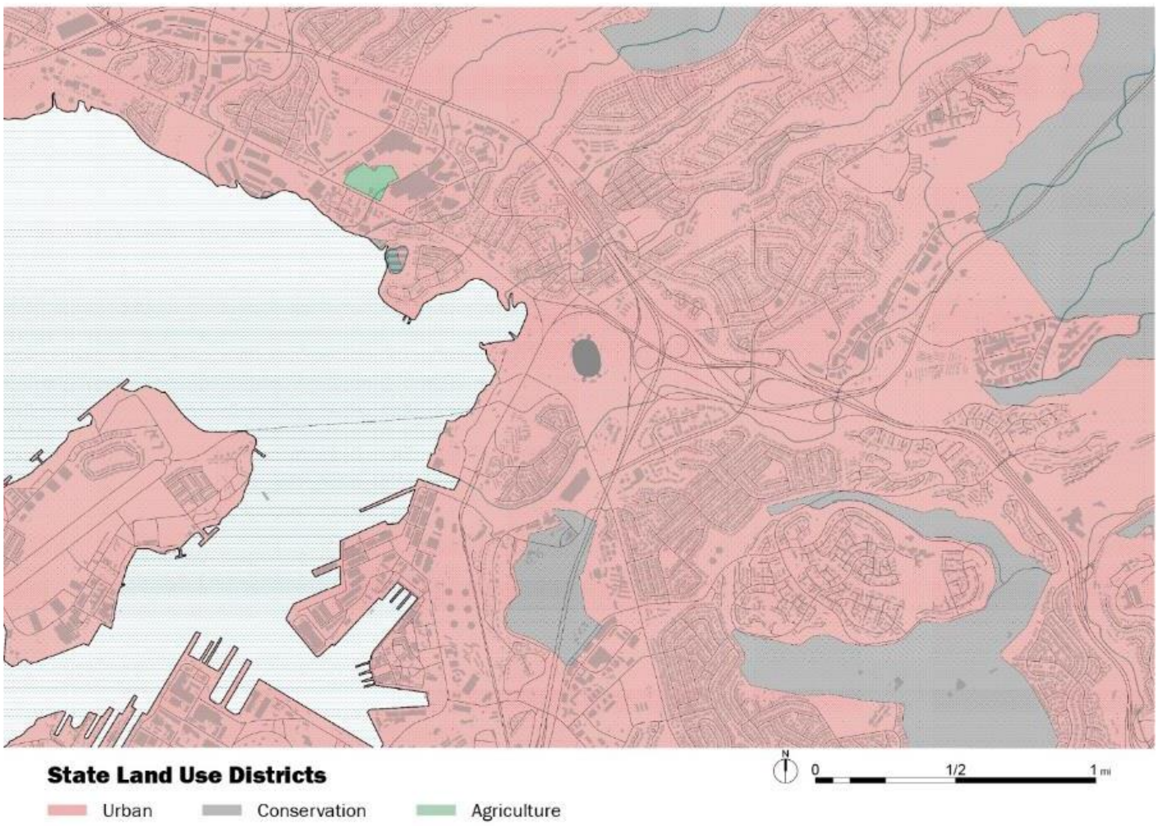

Figure 3-3 State land use districts.

Source: State of Hawaiʻi (Coastline, Street Centerlines, Streams, State Land Use Districts Boundaries). City and County of Honolulu (Building Footprints). Graphic: By Author.

The existing zoning indicates that the majority of the neighborhood, including the entire stadium property and the highway junction area, is zoned R-5 (Fig. 21). R-5 indicates a residential district that is on a lot with a minimum area of 5,000 square feet and is intended to provide areas for urban residential development. According to the Land Use Ordinance (LUO), areas that are zoned for residential buildings and public structures are permitted. Joint use of parking facilities is "allowed with a Conditional Use Permit, and there is a category "Permit-minor subject to standards in Article 5; public hearings are not required."[66] Current zoning allows the existence and use of the stadium, but when redesigning the community, proposals for zoning changes may be necessary.

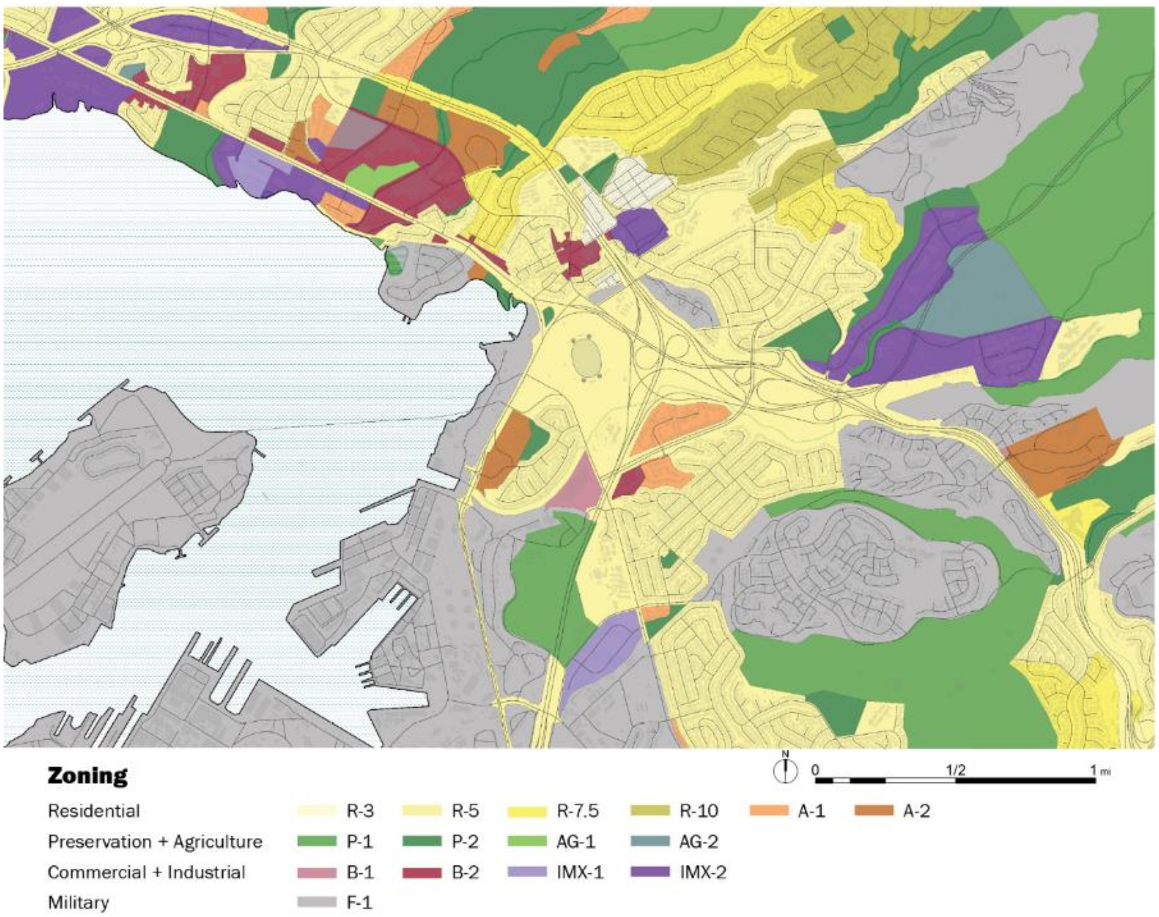

Figure 3-4 Site zoning.

Source: State of Hawaiʻi (Coastline, Street Centerlines, Streams, Oahu Zoning), City and County of Honolulu (Building Footprints). Graphic: By Author.

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[66] City & County of Honolulu, *Land Use Ordinance,* Chapter 21, Article 3, Honolulu: City & County of Honolulu, 2017. PDF, https://www.honolulu.gov/rep/site/ocs/roh/ROH_Chapter_21_art_3.pdf. (October 23, 2017)

Current zoning does not permit the development type needed for a mixed-use Transit Oriented Development. Although it is not necessary to rezone the entire property, it may be beneficial in enabling freer design processes and for further development if the first phase turns out to be successful.

Today the state owns the stadium and its land, and the removal of deed restrictions presents an opportunity to develop the site beyond the scope provided for a public recreational area. The lands were purchased by the City and County of Honolulu in 1967 from the federal government, and they were transferred to the state in 1970.[67] Until the deed restrictions were lifted in April 2017, use of the land for any commercial purposes was prohibited, making this stadium unique due to its being owned and managed by the government (Fig. 22).[68] Although the Aiea Bay State Recreation Area is federally owned, it is a public park with access available to anyone. This property is valuable in terms of connecting the stadium to the ocean and as one of the few public parks in the area. This property should be included in the development proposal to provide a better connection with the stadium, resulting in a more accessible public entertainment/recreation district.

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[67] Foley & Lardner LLP, *Aloha Stadium Comprehensive Site Summary*, Honolulu: Department of Accounting General Services, June 26, 2014, 16-19.

[68] Hawaii News Now, "Deed restrictions lifted from Aloha Stadium, allowing more flexibility for development." April 20, 2017, http://www.hawaiinewsnow.com/story/35201906/deed-restrictions-lifted-from-aloha-stadium-allowing-more-flexibility-for-development.

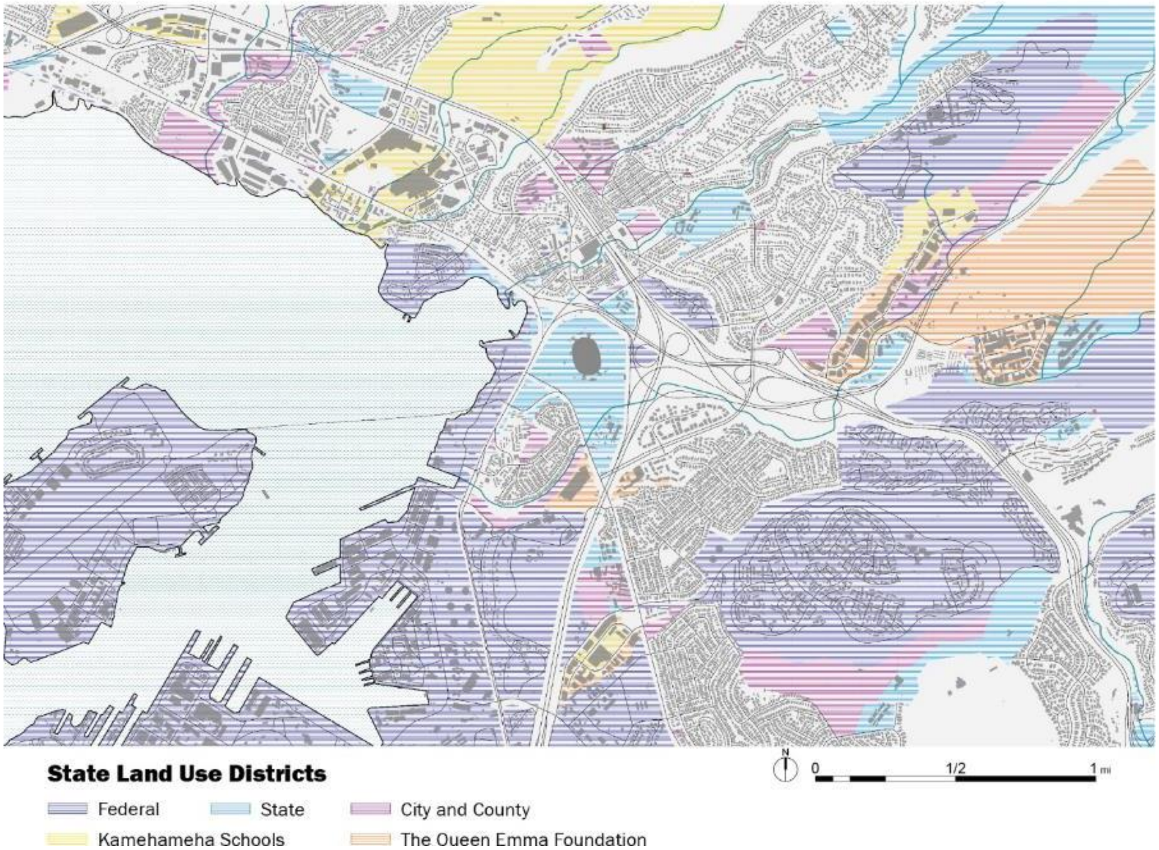

Figure 3-5 Large land owners.

Source: State of Hawaiʻi (Coastline, Street Centerlines, Streams, Large Landowners), City and County of Honolulu (Building Footprints). Graphic: By Author.

The stadium is managed by the Aloha Stadium Authority, under the Department of Accounting and General Services (Fig. 23). The Authority comprises nine members appointed by the Governor, the President of the University of Hawaiʻi, and the Superintendent of Education. The stadium manager is appointed by the Authority and works with the rest of the stadium management team on administration and maintenance of the stadium.[69]

[69] Foley & Lardner LLP, *Aloha Stadium Comprehensive Site Summary*, Honolulu: Department of Accounting General Services, June 26, 2014, 12-13.

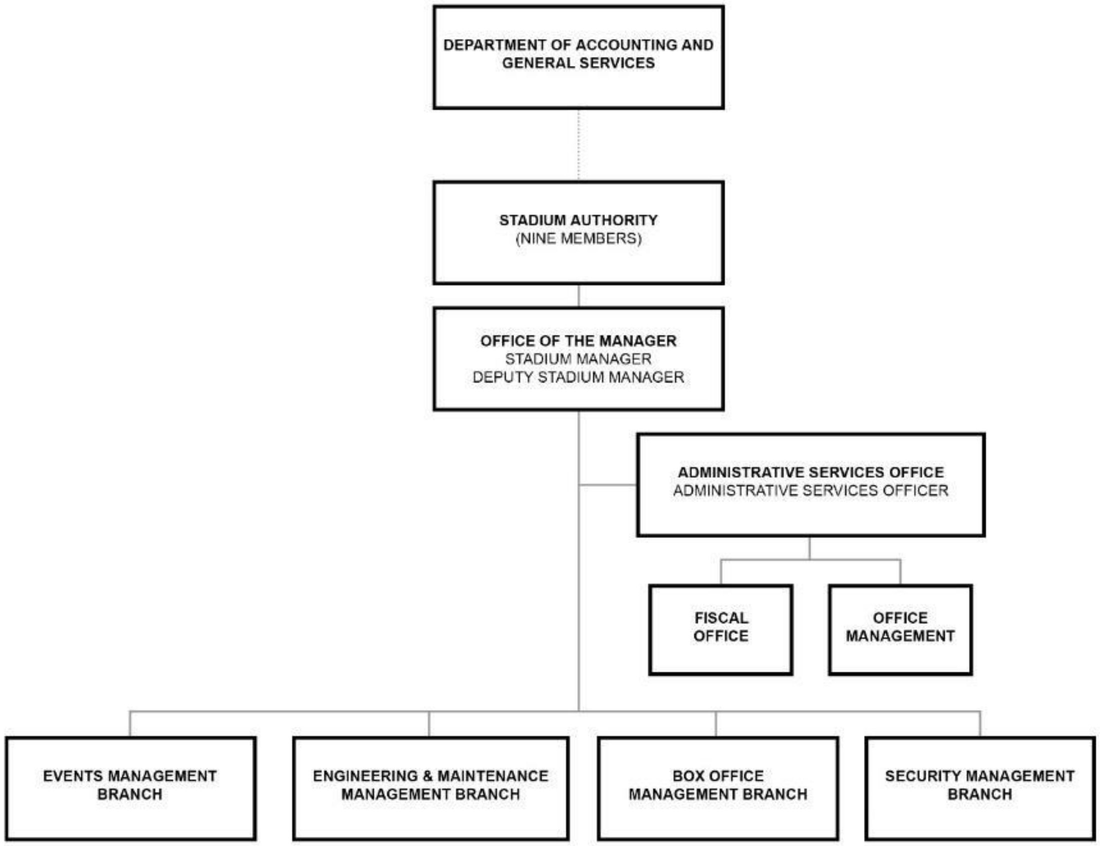

Figure 3-6 Stadium Authority organization chart.

Source: Data from Department of Accounting and General Services. Graphic: By Author.

3.2.3 Environmental Factors

There is an elevation difference of about 40-50 feet from the bay to a point across the Kamehameha Highway at the Northwest side of the stadium. The highest elevation on the property itself is about 60 feet at the North and the lowest by the stream at around 5 feet. Thus, there is an approximately 50- to 60-foot difference, which could affect water management on site.

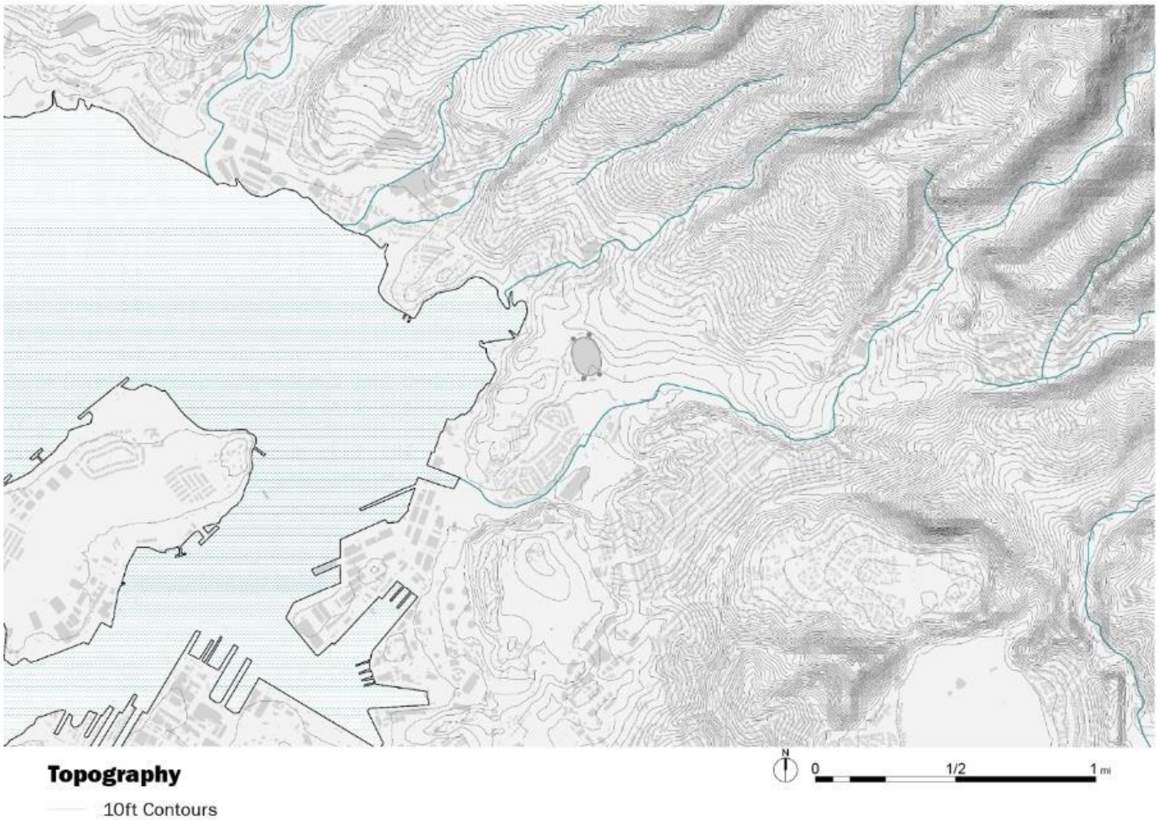

Figure 3-7 10-ft topography.

Source: State of Hawaiʻi (Coastline, Street Centerlines, Streams), City and County of Honolulu (Building Footprints), SOEST (Hawaiian Islands Multibeam Bathymetry Data Synthesis). Graphic: By Author.

Halawa Stream—more a canal or channel—runs through the parking lot on the site and flows out to Pearl Harbor. The original stream was relocated to align with the boundary of the stadium and coordinated with the intersection to the northeast of the site.[70] Currently, it is poorly maintained and the water flow is minimal. There is also a fence surrounding it, making it inaccessible to users. Improving the design along the stream represents an excellent opportunity to enhance connectivity and place-making as well as ecological functions. Aiea Bay is where the recreation area meets

[70] Report and recommendation. Honolulu (Hawaii). Mayor's Stadium Advisory Committee.; 1970 University of Hawaii (Honolulu).

the ocean, a feature that should be utilized. There are also two Hawaiian fishponds nearby, and there are plans to restore the Pa'aiau fishponds.[71]

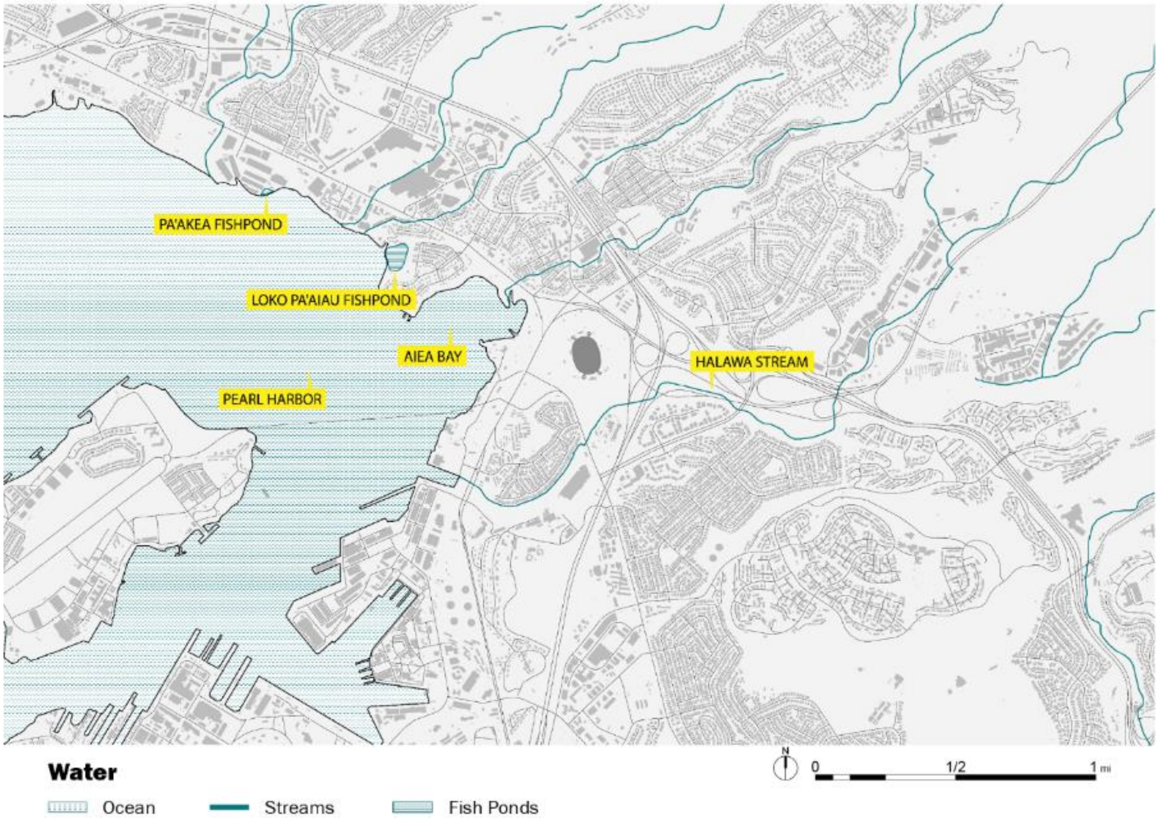

Figure 3-8 Ocean, streams, and fishponds.

Source: State of Hawaiʻi (Coastline, Street Centerlines, Streams), City and County of Honolulu (Building Footprints), Google Maps. Graphic: By Author.

The closest accessible green space is the Aiea Bay State Recreation Area across Kamehameha Highway and Makalapa Park, north of the recreation area. The Halawa District Park is only slightly more than a half a mile away, but the freeway interchange makes it very difficult to achieve direct access. The freeway interchanges have vegetated areas in between the roads. Existing vegetation on-site features non-native

[71] Honolulu, Honolulu County, City County of Honolulu, City of Honolulu, and Belt Collins Hawaii. *Pearl Harbor Historic Trail: Master Plan*, May 2001.

species, including the Monkeypod trees situated radially around the stadium on paved surfaces.[72] Other than the stadium structure itself, these trees are arguably the second most prominent feature on site, especially when seen in aerial views. Onsite vegetation does not exhibit any ecological design qualities, but is intended purely to provide shade for parking, as well as for minor aesthetic reasons.

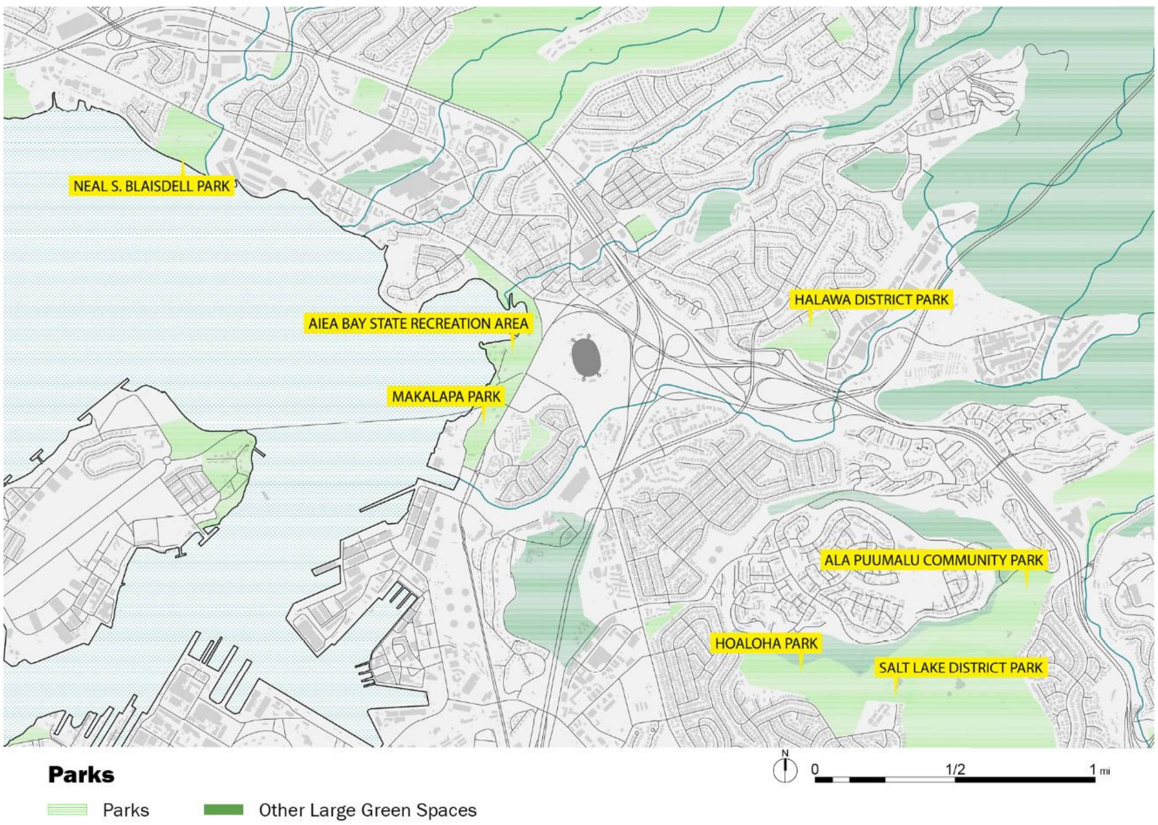

Figure 3-9 Parks and other green spaces.

Source: Source: State of Hawaiʻi (Coastline, Street Centerlines, Streams, Parks), City and County of Honolulu (Building Footprints). Graphic: By Author.

When looking at the map, it becomes obvious that there is a gap in green space between the valleys of the Koolau Mountains and the area by the water. There is an

[72] Myounghee Noh & Associates, L.L.C., *Final Environment Assessment for Whole Stadium Improvement*, Honolulu: Department of Accounting General Services, October 3, 2008, 38.

opportunity to fill in the gap by adding green space on the stadium site, especially by the stream. Green space exists by the freeways, but they are not performative, so there is an opportunity to capitalize on this proximity to create such green spaces as well.

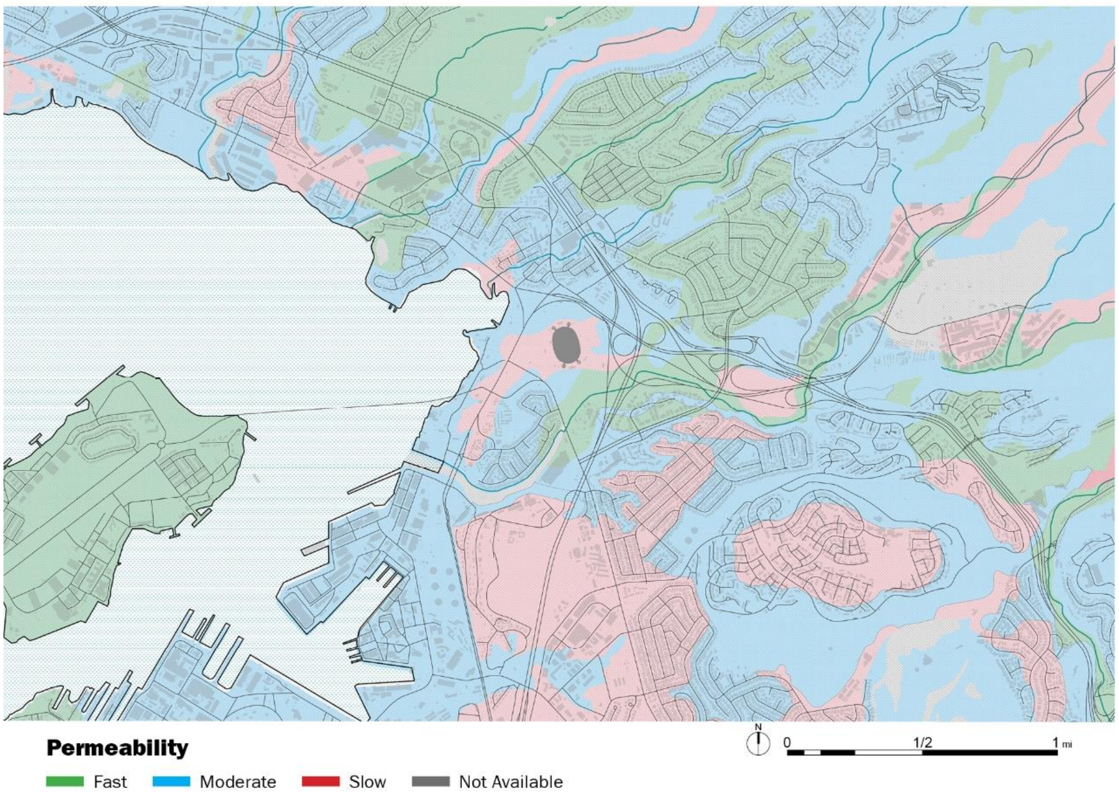

Figure 3-10 Permeability.

Source: Source: State of Hawaiʻi (Coastline, Street Centerlines, Streams), City and County of Honolulu (Building Footprints), University of Hawaiʻi (Downloadable Soil Map). Graphic: By Author.

The soil on site is fertile with a high nutrient holding capacity, well-supplied in calcium, magnesium, and potassium. According to the Hawaiʻi Soil Atlas, maintained by the College of Tropical Agriculture and Human Resources at the University of Hawaiʻi, the “productive soil is found along coastal plains and stream banks on Oahu and Molokai. This soil is well-suited and used for diversified farming, flooded agriculture, and pasture."[73] Although the soil may be ideal for green infrastructure, currently the permeability of the site is low, as it is mostly covered with paved surfaces.[74] This situation offers a superb opportunity to restore the land to a more functional landscape such as constructed wetlands, bioswales, stormwater basins, and community gardens.

3.2.4 Hazards

According to simulations of hurricanes and tsunami surges and shoreline change predictions produced by Pacific Islands Ocean Observing System, sea level rise will affect the immediate coastal areas, including the Aiea Bay State Recreation Area, but it will not affect the stadium site.[75] This means that the public spaces along the coast will no longer be available for use after sea level rise occurs, especially once it reaches 6 feet. It will be important to provide alternate green spaces that remain unaffected by the sea level, as well as spaces that have a direct connection to the ocean in another form.

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[73] "Hawaii Soil Atlas," Collage of Tropical Agriculture and Human Resources, University of Hawaii, accessed January 24, 2018, http://gis.ctahr.hawaii.edu/SoilAtlas.

[74] "Hawaii Soil Atlas."

[75] "Data Services: PacIOOS Voyager," Pacific Islands Ocean Observing System, accessed October 23, 2017. http://www.pacioos.hawaii.edu/voyager/.

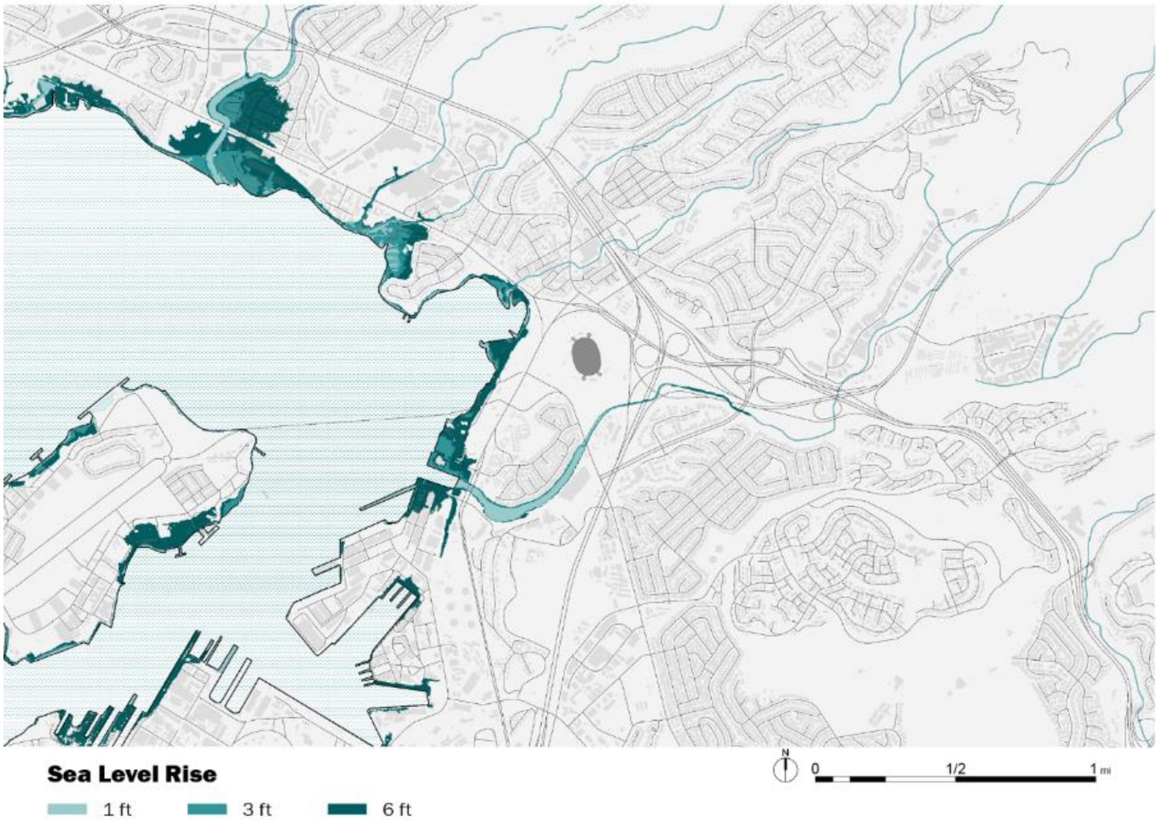

Figure 3-11 Sea level rise at 1, 3, and 6 feet.

Source: State of Hawaiʻi (Coastline, Street Centerlines, Streams), City and County of Honolulu (Building Footprints), NOAA (Sea Level Rise Data Download). Graphic: By Author.

In short, as it is not included in the tsunami evacuation zone, the site will not be affected by the tsunami, thus making it a perfect evacuate site for people in the area. Although nearby areas included in the evacuation zones are not residential areas, easy access to safe zones from the park and possibly the Pearl Harbor Visitor Center is necessary.

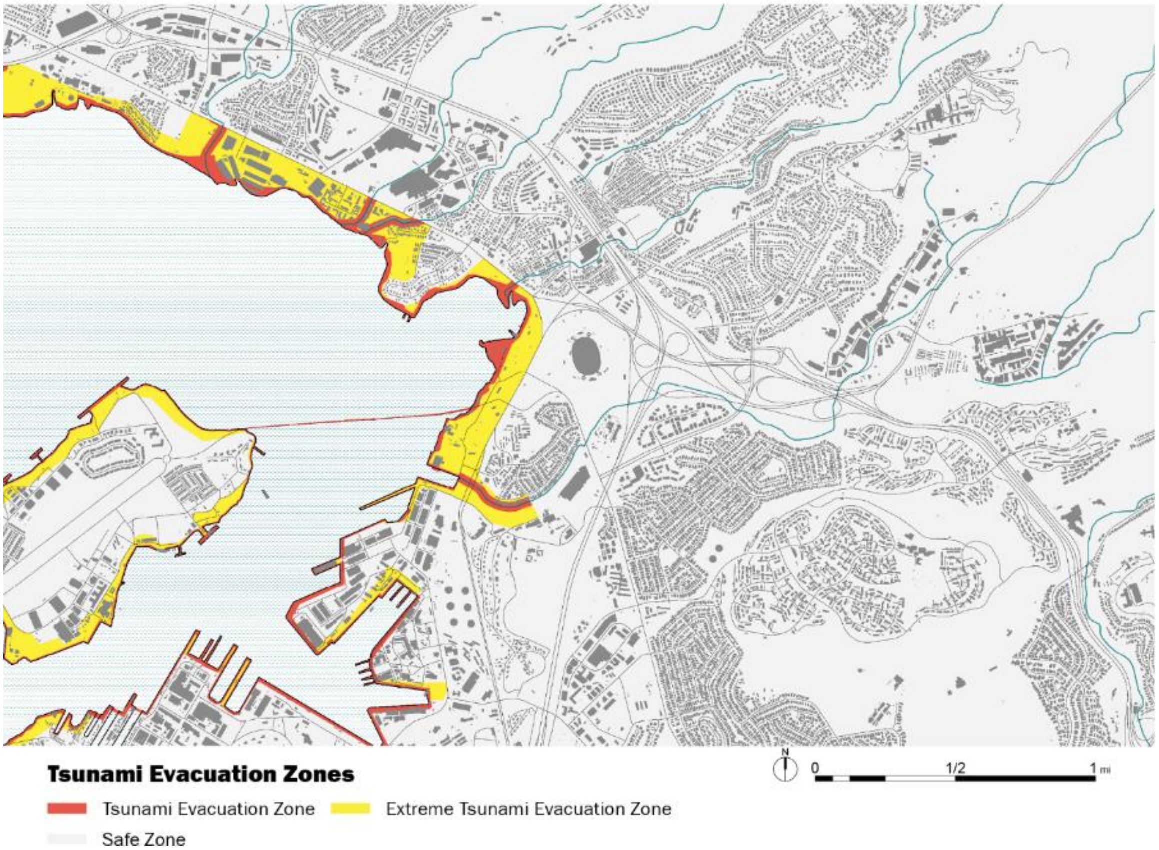

Figure 3-12 Tsunami evacuation zones.

Source: State of Hawaiʻi (Coastline, Street Centerlines, Streams), City and County of Honolulu (Building Footprints), PacIOOS (Tsunami Evacuation Zone). Graphic: By Author.

Water flow at this point along Halawa Stream is minimal, and according to the Flood Insurance Rate Maps, the annual probability of flooding on the site is less than 0.2% (Zone X).[76] The most affected area would be the residential area to the south, along the stream, with areas that have 0.2% (Zone X2) or greater chance of annual flooding, and 1% (Zone AE) or greater of annual flooding.[77] Soft defense strategies to mitigate flooding and elevated walkways would help improve safety and connectivity in the area, even during a flood event.

[76] Honolulu, Honolulu County, City County of Honolulu, City of Honolulu, and CallisonRTKL, Belt Collins Hawaii, Fehr & Peers, and Keyser Marston Associates, *Halawa Area Transit Oriented Development Plan*, July 2017, 26-27.
[77] Ibid.

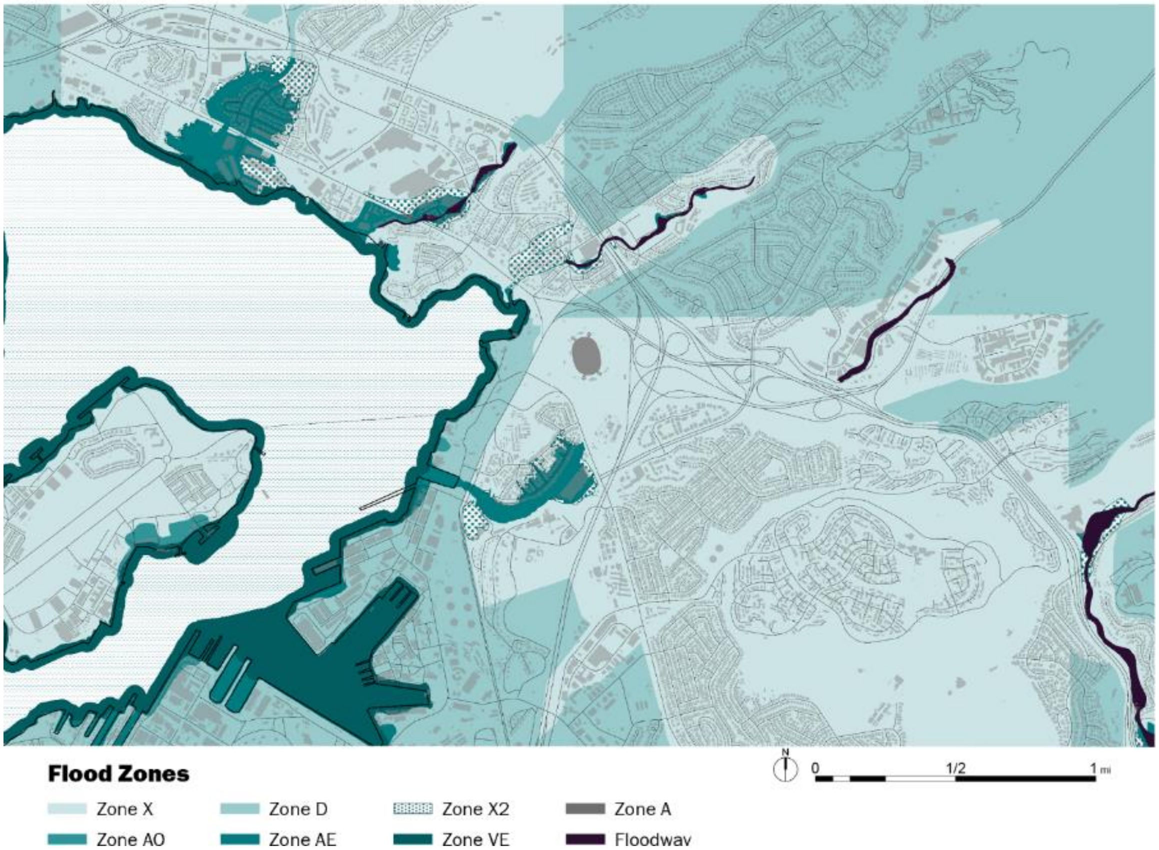

Figure 3-13 Flood zones.

Source: State of Hawaiʻi (Coastline, Street Centerlines, Streams, Flood Hazard Areas), City and County of Honolulu (Building Footprints). Graphic: By Author.

3.2.5 Landmarks and Destinations

Major landmarks and destinations near the site include the Pearl Harbor Visitor Center and USS Arizona Memorial, Aiea Bay State Recreation Area, Aiea Shopping Center, Pearlridge Shopping Center, Stadium Marketplace, and Stadium Mall. To the west is the Aiea Bay State Recreation Area and Aiea Bay, and to both the north and south are residential areas, including public housing. The Halawa Stream runs through the property, dividing the parking lot.

Entertainment and events conducted in the area (but not offered on this property) include Super Garage Sale on Richardson Field, Ice Palace Hawaiʻi in Stadium Mall, Aiea Bowl in Aiea Shopping Center, the Consolidated Theaters in Pearlridge Shopping Center, and Pearl Country Club. Most forms of entertainment in this area can be found elsewhere around the island, except for Pearl Harbor and its various historic sites and museums.

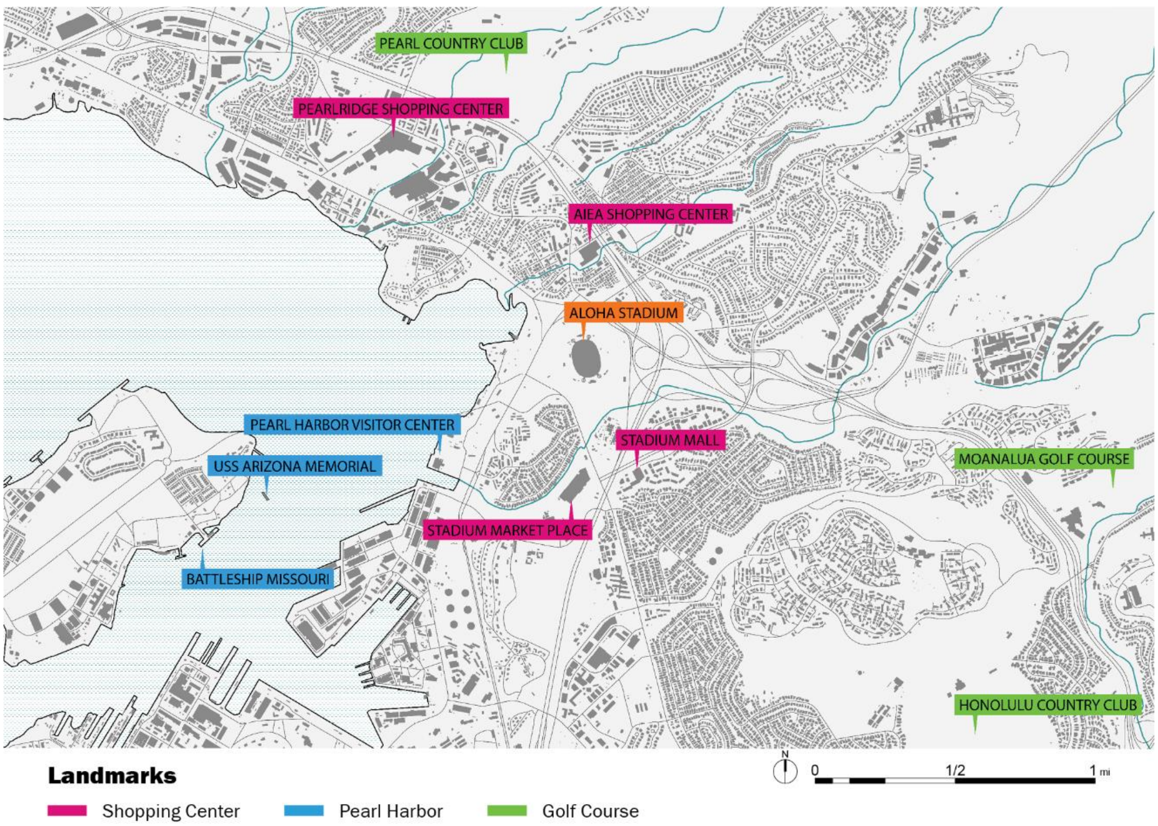

Figure 3-14 Major destinations and landmarks.

Source: State of Hawaiʻi (Coastline, Street Centerlines, Streams), City and County of Honolulu (Building Footprints). Graphic: By Author.

3.2.6 History and Cultural Sites

According to the Aloha Stadium Comprehensive Site Summary released in 2014, no archeological or cultural resources are known to have existed on the property.[78] Regarding the surrounding sites, kuleana lands awarded to Hawaiian commoners around the Halawa Stream were used for kalo, fishponds, and habitation. Fishponds (Kahakupohaku and Keilapaia) existed on the southeast shore of Aiea Bay, but these were subsequently filled by the Navy.[79] Around 1850, the lands were used for growing rice, pasturing cattle, and cultivating sugarcane. Two of the major heiau for Halawa were destroyed for agricultural use.[80]

The area extending further beyond Pearl Harbor has multiple layers of history and culture of its own. Originally called "Wai Momi," meaning "waters of pearl," Pearl Harbor was a shallow bay before being dredged for larger ships.[81] Today it is known primarily for the attack by Japan that prompted the U.S. to enter the conflict in the Pacific in World War II. The Pearl Harbor Visitor Center is also the starting point of the proposed historical trail, which aims to provide a recreational network and drive economic activity, historical education, and conservation of natural resources.[82] Should this plan ever be implemented, the stadium would present an opportunity to

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[78] Foley & Lardner LLP, *Aloha Stadium Comprehensive Site Summary*, Honolulu: Department of Accounting General Services, June 26, 2014, 24.

[79] Arlene Ching, 'Aiea Oral History Project, "ORAL HISTORY INTERVIEW with marguerite Lee Peach," March 26, 2009, 6. http://www.aieaoralhistory.info/pdf/Peach,%20Mauguerite%20Lee.pdf.

[80] Myounghee Noh & Associates, L.L.C., *Final Environment Assessment for Whole Stadium Improvement*, Honolulu: Department of Accounting General Services, October 3, 2008, 35.

[81] Andrew M, "Wai Momi: Pearl Harbor Through History," Peral Harbor Visitors Bureau, accessed October 20, 2017, visitpearlharbor.org/pearl-harbor-through-history-part-1/.

[82] Honolulu, Honolulu County, City County of Honolulu, City of Honolulu, and Belt Collins Hawaii. *Pearl Harbor Historic Trail: Master Plan*, May 2001.

contribute and become a node in the project, benefitting the surrounding community and improving its connectivity to other sites.

Construction of Aloha Stadium was completed in 1975, and the facility opened on September 12th that year. The first event held there, an NCAA football game between the University of Hawaiʻi and Texas A&I, took place the following day. The 50,000-seat stadium is a multipurpose entertainment center designed by Charles Luckman Associates, Los Angeles, California and Michael T. Suzuki, Honolulu, Hawaiʻi.[83] The original budgeted construction cost was $37 million (in 1975 U.S. dollars), but post-completion work on corrosion control and other maintenance and renovations have added $87.9 million to that figure, and more is being added to the total every year. [84]

The original design was unique for its time, allowing the configuration of the stands to be changed for different types of events, particularly football and baseball (Fig. 18). As can be seen in the illustration below, sections along the sidelines of the football field were once moveable by means of a conveying system called "air film technology," in which compressed air was used to move the 3.5-million-pound sections. In 2007, these were locked permanently into the configuration used for football based on a state-commissioned planning study done in 2005, with the principal reason for the decision being the increasing cost of maintenance. These four sections were constructed with structural weathering steel, thought to be the

[83] Wiss, Janney, Elstner Associates, Inc., *Aloha Stadium Planning Study Final Report*, Honolulu: Department of Accounting General Services, December 22, 2005, 3. http://media3.hawaii.gov/media/dags/web/alohavol1.pdf.
[84] Ibid.

perfect material until it was found that the initial layering of rust—called protective patina—did not protect the steel from further corrosion in a salty environment like Hawaiʻi's.

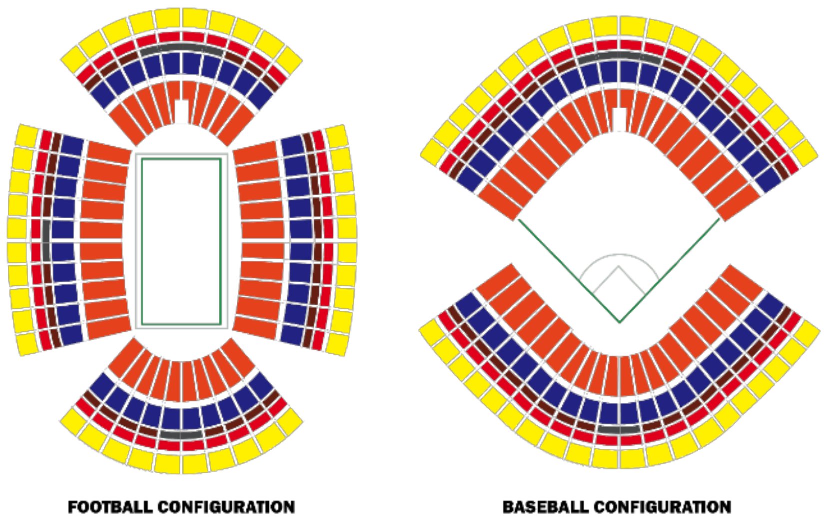

Figure 3-15 Original stadium configurations for football and baseball.

Source: Aloha Stadium Planning Study Final Report, Department of Accounting and General Services. Graphic: By Author.

3.2.7 Current Use

Today the stadium is known as the home of the University of Hawaiʻi Rainbow Warrior Football team, and the Pro Bowl (from 1980-2016 seasons, except for 2010 and 2015), until those games were moved to Orlando, Florida. According to the 2017 Aloha Stadium Conceptual Redevelopment Report, there were 316 events held at the stadium in 2016 (Table 2).[85] 57 of them were in-stadium sporting events, with the remaining 259 comprising other events. Of those 259 other events, 192 were held outside of the stadium, with 155 of those being Aloha Stadium Swap Meet &

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[85] Foley & Lardner LLP, VICTUS Adcisors, Populous and Jones Lang LaSalle, *Aloha Stadium Conceptual Redevelopment Report*, Honolulu: Department of Accounting General Services, February 23, 2017, 16.

Marketplace events. This indicates that approximately 60% of the events categorized as stadium events were held outside the stadium, with only about 20% being in-stadium sporting events, thus revealing how the surrounding area serves a key on-site function and could be an ideal location for bringing the community together.[86]

Table 3 Annual Event Activity

In-Stadium Athletic Events	FY2014	FY2015	FY2016
Hawaii State Jr. Prep. Association Football	10	8	3
Interscolastic League of Hawaii Football	12	8	10
Pop Warner	5	5	6
University of Hawaii Football	6	7	7
Other (Football, rugby, soccer, etc.)	18	22	31
Other Events Onsite			
Swap Meets	151	153	155
50th State Fair	20	24	20
Sports Car Club of America	14	16	14
Runs	4	5	3
Other (Graduations, parties, etc.)	70	61	67
Total Events Onsite	310	309	316

Source: Aloha Stadium Conceptual Redevelopment Report. Graphic: By Author.

3.2.8 Transportation

The system of roads is the largest type of infrastructure, and the most popular way of getting to the stadium currently is by driving. Immediately to the east of the stadium is a highway junction where H-1, H-2, H-3 and H-201 cross, which allows easy access from all directions—if one has a car. It is also important to note that this junction area covers an area almost the size of the stadium property, including the parking area.

[86] Ibid.

Although it is not currently functioning at its full potential, the stadium can be made a transportation node by taking advantage of its location as the crossroads of Urban Honolulu and West Oahu, its proximity to the airport, and the fact it is only a quarter-mile from the future rail station. Whenever a large event is held at the stadium, it increases demand on transportation systems, exacerbating the already overwhelming traffic Oahu experiences during rush hours. It is critical to provide transportation options to the site not only for visitors but also for the local residents who use the same transportation systems in commuting.

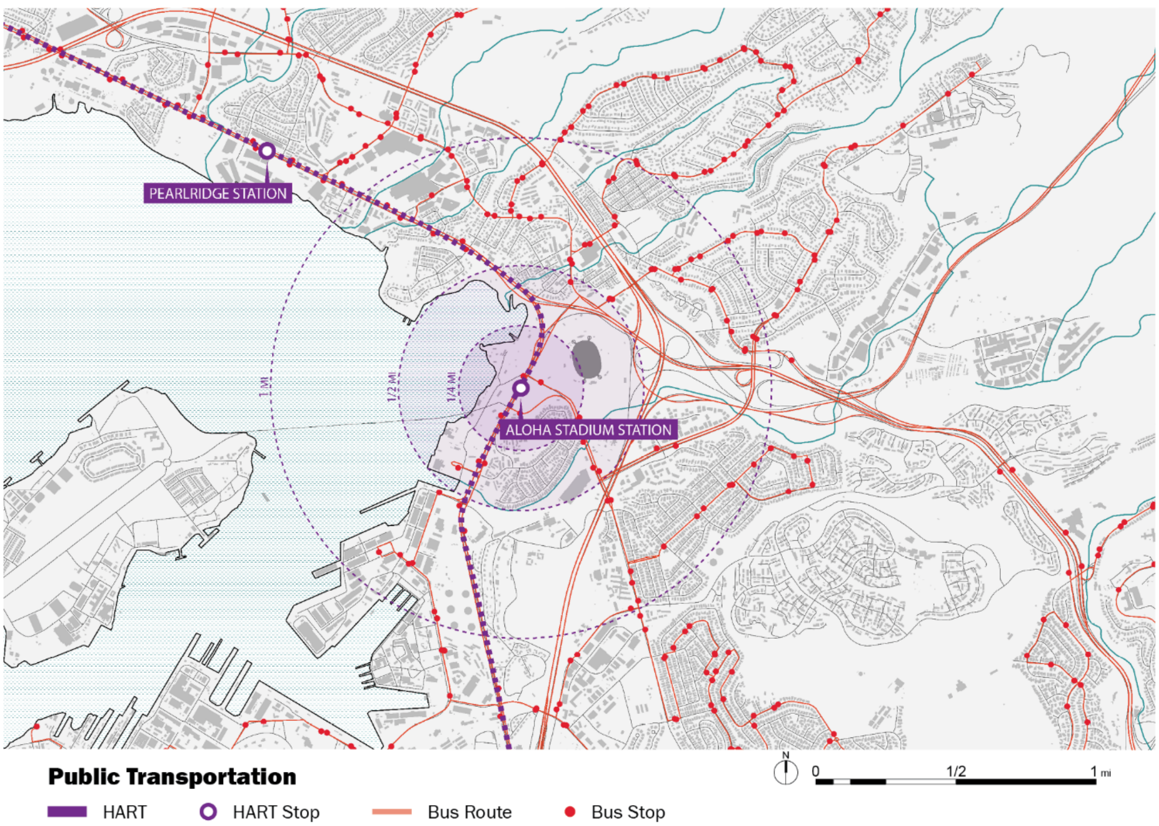

Figure 3-16 Public transportation.

Source: State of Hawaiʻi (Coastline, Street Centerlines, Streams, Bus Routes, Bus Stops), City and County of Honolulu (Building Footprints), Honlulu Land Information System (Proposed Rail and Stations). Graphic: By Author.

Compared to the twenty-minute drive (with no traffic), public transportation options require planning ahead of time. It takes a minimum of one hour (with no traffic and no transfers) to get to the University of Hawai‘i Mānoa campus by bus. This is currently the only public transportation available. Other options include free round-trip shuttle rides for students and the UH Football Express run by Roberts Hawaii from five locations (Hawai‘i Kai, Kahala, Kailua, Kaneohe, and Mililani).[87]

Table 4 Transportation Options to Aloha Stadium

Mode of Transportation	Directions	Travel Time	Cost
Vehicular	From the East (Honolulu/Waikiki): H-1 Westbound I-H201 W/HI-78 via Exit 19B toward Fort Shafter/Aiea EXIT 1 toward Stadium/Camp Smith/Halawa From the West (Koolina, Kapolei, Waianae): H-1 Eastbound I-H201 E/HI-78 E via EXIT 13B EXIT 1B toward Stadium/Pearl Harbor From Windward Side (Kailua/Kaneohe): H-3 W toward Pearl Harbor EXIT 1C toward Stadium/Halawa/Camp Smith/Aiea	From UH Manoa: 20-30 min (without traffic) From Hawaii Kai: 30-45 min (without traffic) Kapolei: 20-30 min (without traffic) Kaneohe: 20-30 min (without traffic)	Stadium Events: $7.00/Car $30.00/Bus or Limousine Swap Meet: $1.00/Person for 12 and up
UH Manoa Student Shuttle	Buses will depart from campus two hours before game time from lower campus on Kalele Road, near the football and soccer practice fields. All buses will return to campus after each bus is filled up at the conclusion of the game. Drop-off will occur near Frear Hall near the intersection of Dole Street and East-West Road.	30-45 min	Free
UH Football Express Shuttle Service	The shuttle service provided by Roberts Hawaii, with pickup locations at Hawaii Kai, Kahala, Kailua, Kaneohe, and Mililani Mauka. Departure times are 2.5 hous prior to the game for Hawaii Kai and Kailua, and 2 hours prior for Kahala, Kaneohe, and Mililani Mauka.	Hawaii Kai 45-60 min Kahala 35-50 min Kailua 35-50 min Kaneohe 20-35 min Mililani Mauka 20-35 min	Single Game Round Trip $17.00 5 Game Package $70.00 6 game package $84.00 One-way $10.00
The Bus	Routes that stop at nearby bus stops: 11, 20, 32, 40, 42, 54, 62, 74, 88A, A, PH1, PH2, PH3, PH7 To get to the stadium you may need to transfer on to buses listed above.	From UH Manoa: "A" bus 50 min plus walk 10 min Total of about an hour.	$ 5.00 for Round Trip

Source: State of Hawaii, University of Hawaii at Mānoa Athletics, Roberts Hawaii, City and County of Honolulu.

Graphic: By Author.

Bicycle and pedestrian access is very poor. Accordingly, the quality of sidewalks and bicycle pathways in the area must be improved to provide safety and comfort for cyclists and pedestrians accessing the site. Sidewalks are narrow and lack vegetation and shading. To the north of the stadium, there is a pedestrian overpass that crosses over the freeway, providing direct access to the site. Bicycle infrastructure has

[87] “UH Football Express,” Roberts Hawaii, accessed October 20, 2017, https://www.robertshawaii.com/transportation/uh-football-express/.

continued to improve around the urban core of Honolulu, with features such as the protected bike lanes on King Street and the recently introduced bike share program called Biki. Such efforts have yet to be extended beyond the urban core, but with a majority of the land use surrounding the stadium being residential with some commercial use, the community can benefit greatly from these improvements, thus further encouraging the use of such means of transportation.

3.3 Current Plans

This research is in part focused on studying current plans for this area and identifying "gaps" where plans could be improved. Two proposals have been prepared by the City of Honolulu as a part of the TOD along the future rail, and a conceptual design proposal was commissioned by the State of Hawaiʻi. This section will focus on these proposals and mention some other development plans and guidelines that may affect the site.

3.3.1 Transit Oriented Development

The Transit Oriented Development plan is a mixed-use development plan to create walkable communities around public transportation, in this particular case the Aloha Stadium Station of the HART (Honolulu Authority Rapid Transit) stations (Fig. 33). The proposed stadium station, included in the Halawa area plan, is about a quarter mile from the site. The plan aims to increase the connectivity between the station and the stadium, providing comfortable access to all kinds of transportation methods within the district, while establishing a vibrant community with mixed-use development and community-oriented open spaces. Some of the major changes proposed under the plan include increasing density in the area by changing the zoning from what is now mostly R-5 to BMX-3, AMX-2, and AMX-3, building parking structures, redesigning the streetscape, and—possibly—building a new stadium.[88]

Today, the communities surrounding the stadium are very quiet, in terms of the level of activity taking place outdoors, and they can feel unsafe at times. As the stadium also creates a large block of property separating these neighborhoods, it becomes inaccessible to the public most of the time, thus making it difficult to travel around the area without a car. The TOD plan excels in improving connectivity (especially from areas within the scope of HART) and streetscapes to make the journey safer and more comfortable. Proposals for greenscapes and central gathering space by the stadium will activate areas that are currently underutilized and connect the diverse community, both literally and figuratively.

[88] Honolulu, Honolulu County, City County of Honolulu, City of Honolulu, and CallisonRTKL, Belt Collins Hawaii, Fehr & Peers, and Keyser Marston Associates, *Halawa Area Transit Oriented Development Plan*, July 2017, 86.

Figure 3-17 Proposed complete street illustration.

Source: City and County of Honolulu.

Figure 3-18 Masterplan of the City proposal.

Source: City and County of Honolulu.

There are also concerns with the plan, such as the extent of ecological design incorporated, how it fails to address the possible opportunities for utilizing the open space in the highway interchange, and how it includes areas that could possibly be affected by extreme weather events and future sea level rise. The description of sustainability is overly broad and vague, employing expressions such as “harness natural energy sources,” “minimize the use of water,” “maintain the Monkey-pod trees,” and “reduce waste.”[89] There is an opportunity here to incorporate some ecological design methods to improve the performance of infrastructure.

Another concern involves redevelopment of existing public housing into a mixed-income development. Recent projects on Oahu have had housing developed with condominiums separated from affordable housing, based on the concept that including low-income units and residents lowers the value of the property. The TOD plan proposes a mixed-income development where the Puuwai Moni Public Housing currently is situated. The range of mixed-income being considered is unclear because “government agencies have adopted mixed-income housing as a planning strategy without carefully examining—or even defining—what mixed-income housing is, what characterizes it, and how mixed-income projects differ from one another.”[90] Careful consideration of what is to qualify as eligible Annual Median Income and residents’ current income levels is required to avoid displacing residents. At the same time, mixed-income housing can lead to the surfacing of inter-class social issues. Such projects must address and satisfy the needs of all classes, and for the project to

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[89] Ibid., 40.

[90] Vale and Shamsuddin Vale, Lawrence J., and Shomon Shamsuddin. "All mixed up: Making sense of mixed-income housing developments." *Journal of the American Planning Association* 83, no. 1 (2017): 56-67.

succeed, it must satisfy a “magic formula for the proportion of low-, moderate-, and upper-income tenants.”[91]

3.3.2 Aloha Stadium Conceptual Redevelopment Report and Corrosion Report

The Department of Accounting and General Services of the State of Hawaiʻi and the Aloha Stadium Authority commissioned this report. The report consists of two parts—an analysis, and a conceptual master plan and stadium design. The analysis portion consists of history and current conditions, current and proposed usage, and demographic and socioeconomic analyses comparing Aloha Stadium with other stadiums in the Mountain West Conference, to which the University of Hawaiʻi football team belongs. The report takes into consideration the most recent structural study and concludes that maintaining the current stadium is too costly and that a 50,000-seat stadium is now unnecessary and should be downsized to 35,000-40,000 seats, which would allow hosting of a greater variety of events and encourage further development of the surrounding area.[92]

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[91] Ellen Pader and Myrna Breitbart. "Transforming Public Housing: Conflicting Visions." *Places: Forum of Design for The Public Realm* 8, no. 4 (1993): 36.

[92] Foley & Lardner LLP, VICTUS Adcisors, Populous and Jones Lang LaSalle, *Aloha Stadium Conceptual Redevelopment Report*, Honolulu: Department of Accounting General Services, February 23, 2017, 2.

Figure 3-19 Masterplan of the State proposal.

Source: State of Hawaiʻi.

Figure 3-20 Concept rendering of the State proposal.

Source: State of Hawaiʻi.

The design proposes building the new stadium to the north of the current stadium's site. The radial grid of the current design would be maintained by developing a mixed-use (mostly retail) section and an outdoor plaza placed along the grid.[93] According to a news article from Hawaii News Now, Senator Glenn Wakai says that this supplemental district surrounding the stadium should use L.A. Live, an entertainment complex across from Staples Center in Downtown Los Angeles, as a precedent.[94] However, while this concept and the scale of development may be successful in L.A., the population—especially in the immediate environs—and vibrancy are not comparable to those in Halawa or Aiea.

Along with the proposal, there was separate corrosion report prepared by Wiss, Janney, Elster Associates Inc. This report's findings are the basis of the argument for building a new stadium. Stadiums are large public facilities that host thousands of people per event, so safe utilization is an issue of central importance. As mentioned in the previous section on the stadium's history (3.2), Aloha Stadium was constructed with weathering steel that failed to develop a protective coating, leading to further rusting. Annual estimated costs include $300 million for health and safety repairs as well as $121 million for disability improvements, along with another $30 million for maintenance.[95] One of the main arguments for building a new stadium is the existing stadium's structural damage and the costly maintenance. Although the report focuses on the most severe cases, proposing short-term solutions to allow the stadium to continue operating, this approach is considered unsuitable, as it means attempting to maintain the stadium as a "first-class" venue merely by keeping up

[93] Ibid., 26.

[94] Hawaii News Now, "Aloha Stadium conditions called 'deplorable' after rusty bleachers worries fans." September 25, 2017. http://www.hawaiinewsnow.com/story/36450032/new-video-shows-deplorable-condition-of-aloha-stadium.

[95] Foley & Lardner LLP, VICTUS Adcisors, Populous and Jones Lang LaSalle, *Aloha Stadium Conceptual Redevelopment Report*, Honolulu: Department of Accounting General Services, February 23, 2017, 3.

with maintenance requirements, or in other words, continuing operations by satisfying bi-annual inspections.[96]

Below are some images (Fig. 25) from a visit the site made to observe the extent of the rusting. Most surprising as well as alarming were the yellow seats at the very top level, which feature perforations and other temporary measures to keep the space occupiable.

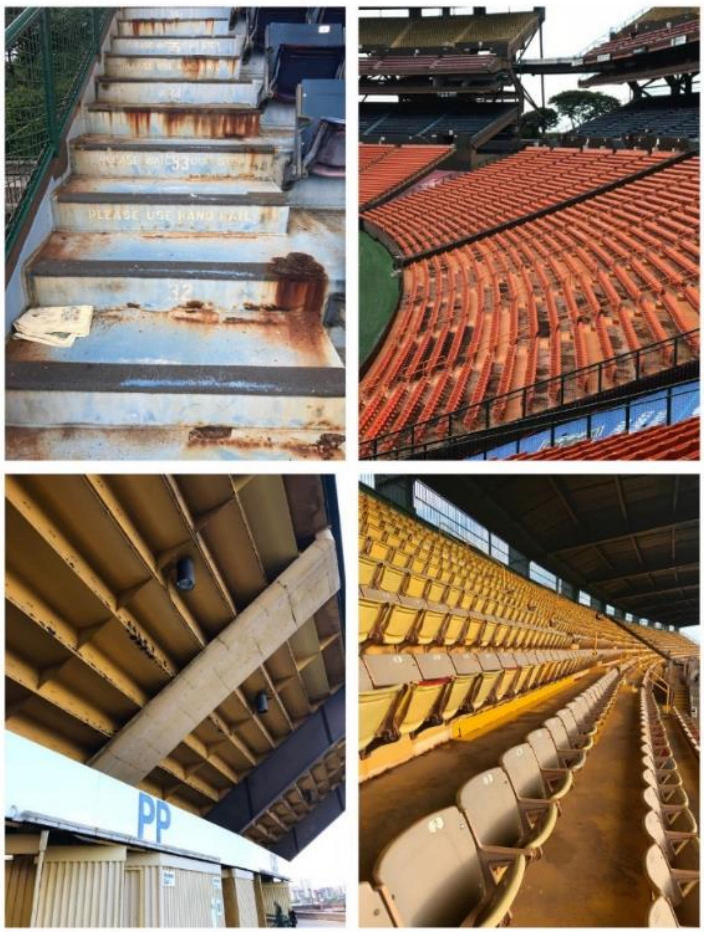


Figure 3-21 Images of rusting facilities at Aloha Stadium.

Source: Photographed by Author.

[96] Wiss, Janney, Elster Associates Inc., *Aloha Stadium Corrosion Review Final Report*, Honolulu: Department of Accounting General Services, October 26, 2016, 19-21.

3.3.3 Other Development Plans

The TOD plan and the stadium redevelopment proposals are not the only development plans that will influence the stadium's future. The table below shows the different types of plans that are in place and how these may affect the design of the stadium and its surrounding community (Table 4).

Table 5 Existing Plans and Ordinances

Existing Plans and Ordinances	Year*	Description
Oahu General Plan	2002	Comprehensive statement of objectives and policies for the future of Oahu. Outlines the City's general policies on a variety of subjects.
Bike Plan Hawaii Master Plan	2003	Outlines how the State intends to accommodate and promote bicycling through existing and future facilities, policies, and programs to ensure a successful bicycle network.
Primary Urban Center Development Plan	2004	The PUC DP region, which extends from Pearl City west of Aloha Stadium to Kahala in east Honolulu. It is Oahu's most populous region. Includes specific policies and guidelines for land use and infrastructure decisions over a 20 to 25 year period.
Oahu Bike Plan	2012	The City Department of Transportation Services' (DTS) bikeway planning for the entire island of Oahu.
Statewide Pedestrian Master Plan	2013	Focuses on improving pedestrian safety and enhancing pedestrian mobility and accessibility to help create a multi-modal transportation system.
Honolulu Complete Streets Design Manual	2016	Provides guidance on planning and designing City streets to adhere to the legal framework established in the 2009 State complete streets legislation and subsequent City ordinances signed into law in 2012.
Transit Oriented Development Ordinance	2017	The City has adopted provisions in the LUO to allow for the establishment of TOD Special District regulations and design standards to foster and encourage TOD and redevelopment.
Aloha Stadium Conceptual Development Plan	2017	A summary and introduction to market study, conceptual plan, and cost and feasibility study for the redevelopment of Aloha Stadium.
Land Use Ordinance	2017	The city's zoning code.

*The most recent revision year.

Source: City & County of Honolulu, Halawa Area Transit Oriented Development Plan. Graphic: By author.

3.4 Conclusion

Halawa is now undergoing a transitional period with multiple development plans in different scales being studied, including the TOD plans and Primary Urban Center Development Plan, which look at the development of a region, as well as street-level plans such as the Oahu bike plan and the Honolulu Complete Street Design Manual, and the Aloha Stadium Conceptual Redevelopment Report, which concentrates on the stadium and its immediate surroundings. Despite the number of plans in place, however, there is a disconnect in the various plans' layers. Aloha Stadium is situated in a superb location that will be served by the future Stadium Station and with highway access from multiple directions. Completion of the rail work and other transportation options will further improve access. The site is also located in a flood-safe zone and boasts the potential of serving as a shelter during natural disasters. Applying principles from the categories studied in the previous chapter makes it clear that this site holds tremendous potential to serve the currently disconnected community and to become a prime destination for people both in and from outside this community.

4. The New Ecological and Human-Focused Proposal

4.1 Design Context and Intent

As mentioned in previous chapters, existing proposals for the future of Aloha Stadium and its surroundings have been prepared by the State of Hawaiʻi and the City and County of Honolulu. These proposals were prompted by future rail construction and subsequent TOD development as well as the aging of the facility. Although both proposals are thorough and functional, neither one sufficiently explores crucial ecological issues, human/social interactions, or climate-related problems.

The proposal from the City and County is an element of the TOD plan, under which most of the development would be situated within a quarter mile from the train station. This proposal also calls for the stadium to be demolished and relocated, but instead to the northwest of the existing stadium, leaving the rest of the site primarily for parking (structure and surface). In contrast to the state proposal, it includes an in-depth exploration of connectivity, especially the aspects of complete streets, alternative transportation, and the comfort of such users.

The State's proposal has a primarily economic focus, promoting a program that maximizes the possibility of revenue from the site. This results in a mixed-use development that would be situated along a promenade connecting the rail station to the stadium, more towards the center of the site, and to residential development on the edges of the site surrounding the stadium district. The plan calls for the demolition of the present Aloha Stadium, with a new stadium to be located at the southern boundary of the existing stadium and Halawa Stream. An entertainment district and underground parking structure would be developed on the site of the original stadium.

Although both proposals feature strong design concepts, the stadium and its surroundings could be further enhanced by execution of the principles described in the earlier chapters of this project. The intent of this project is to propose a design that incorporates an explicit focus on such elements while retaining a number of design ideas from the existing proposals.

This chapter is organized according to three scales—urban, site, and intervention—with an investigation of appropriate design concepts at each corresponding scale.

4.2 Urban Scale

According to the site investigation in the previous chapter, there are two main concepts that can take advantage of opportunities at the urban scale. The first addresses the lack of functional green space along the Halawa stream. Towards the Koolau range, the majority of the land is still untouched forest, but once it reaches the developed area, green space becomes limited, with functional green spaces occupying virtually none of that land. Most of the surface—including the many highways adjacent to the site—is paved, thereby draining polluted runoff into the stream and eventually to the ocean. The Aloha Stadium property is also mostly covered by surface parking, which also contributes to the polluted run-off.

The other opportunity appears in the chance to improve connectivity around the stadium area where it lacks pedestrian, cycle, and public transportation infrastructure. This problem primarily stems from the fact that the large stadium property is closed off when there are no events, with the major roads (Interstate highways, freeways) acting as obstacles for people who use transportation options other than cars, thereby causing the surrounding neighborhoods to seem disconnected from the site. Thus, improving the quality, safety, and comfort of these connections is a vital requirement in developing a successful public center.

The major challenge at the urban scale lies in these freeways and major roads that hinder connections between the surrounding neighborhood and the stadium district. These obstacles are both vertical and horizontal, creating an invisible boundary that makes the site inaccessible and unwelcoming. In constructing new paths, there will be a need to build overpasses, elevated paths, and in some instances (especially when working along the stream), routes will need enough clearance under the bridge. The routes must be designed carefully in order to generate the most sensible options for technological as well as ecological strategies. Although flooding, sea level rise, and tsunami are not imminent threats at the immediate site, these will affect the surrounding areas that lie along the coastline and the stream. We can and should recognize the need to raise infrastructure that is currently underground and prepare for these events in the future.

4.2.1 Reconnecting the Green Spaces

As mentioned in the previous chapter, both performative and accessible green spaces around the stadium are limited. Green spaces become key components for comfortable public spaces and in environmental design. This section explores urban scale designs that could be implemented to improve such spaces.

- Goals
  - Adding green spaces to areas that are predominantly paved surfaces.
  - Reestablishing green spaces in landscapes that are functional and productive.

- Types of interventions
  - Constructed wetlands by the freeways, parking lots, and developments.
  - Community garden to the east of the new stadium.
  - Softening the hard edges along Halawa stream with a more gradual slope, vegetation, and activities.
  - Green corridors between residential and commercial areas along circulation for shading.

- Benefits
  - Directing the course of the polluted run-off and possibly cleaning it before it enters the stream and eventually to the ocean.
  - Establishing a productive landscape where the community members can grow and harvest their own food.
  - Vegetated areas contribute to lowering the surface heat and increase comfort.

Figure 4-1 Urban Scale: Existing Green Space

1. Recreation Area

(Author)

2. Ring of Monkey Pods

(University of Hawai'i Athletics)

3. Vegetation Along Freeway

(Google Maps)

4. Halawa District Park

(Map of Play)

Figure 4-2 Urban Scale: Reconnecting Green Spaces

1. Green Corridor

(Zibi, Biorigional)

2. Soften Hard Edges

(stari4ek, Flickr)

3. Community Gardens

(City of Edmonton)

4. Constructed Wetlands

(South Carolina Department of Transportation)

4.2.3 Reconnecting People and Space

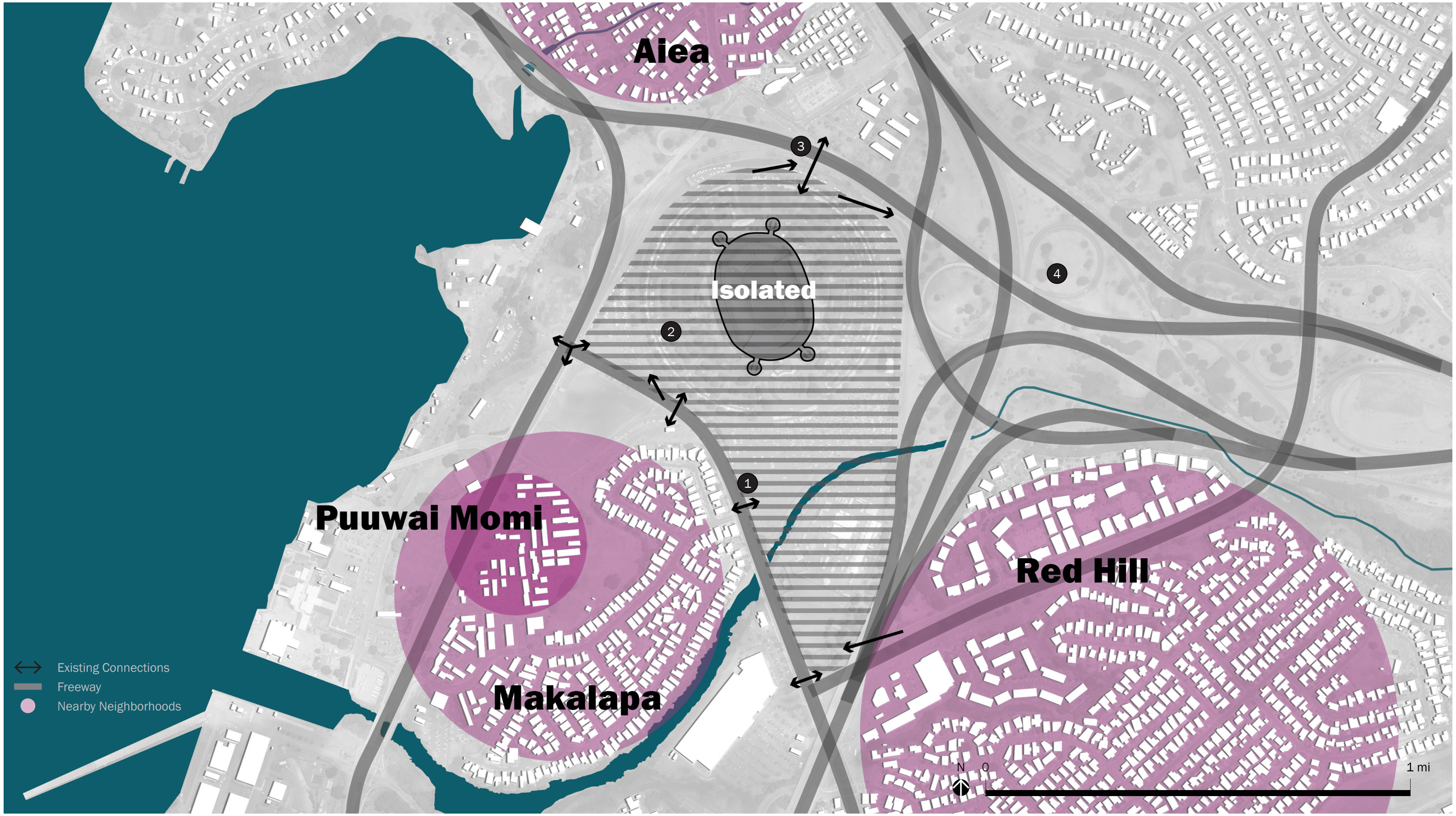
The current stadium has created a physical and visual barrier between the facility and its surrounding neighborhood and only opens its doors when there is an event on site. The following presents some larger-scale design ideas that could make the site a more welcoming space for all kinds of users.

- Goals
  - Improve infrastructure for slower traffic to encourage walking and biking.
  - Improve connectivity of both the immediate site and the neighboring communities.
  - Prepare infrastructure for future changes such as rail, sea level rise, and future development.

- Types of interventions
  - Elevated paths for leisure transportation (walk, jog, run, [bike]) that are continuous without breaks.
  - Entertainment paths that have a relationship with the commercial areas and the stadium, primarily where the mixed-use developments are located.
  - Green corridors along major roads to separate vehicular and pedestrian traffic and within residential districts.

- Benefits
  - Excellent opportunity to prepare for future extreme conditions.
  - Allows a range of users with different types of connections.
  - Safe and comfortable experience for users.
  - Encourages people to use alternative transportation, leading to fewer cars.

Figure 4-3 Urban Scale: Existing Access Barriers



1. Limited Crosswalks

(Google Maps)

2. Large Surface Parking

(Author)

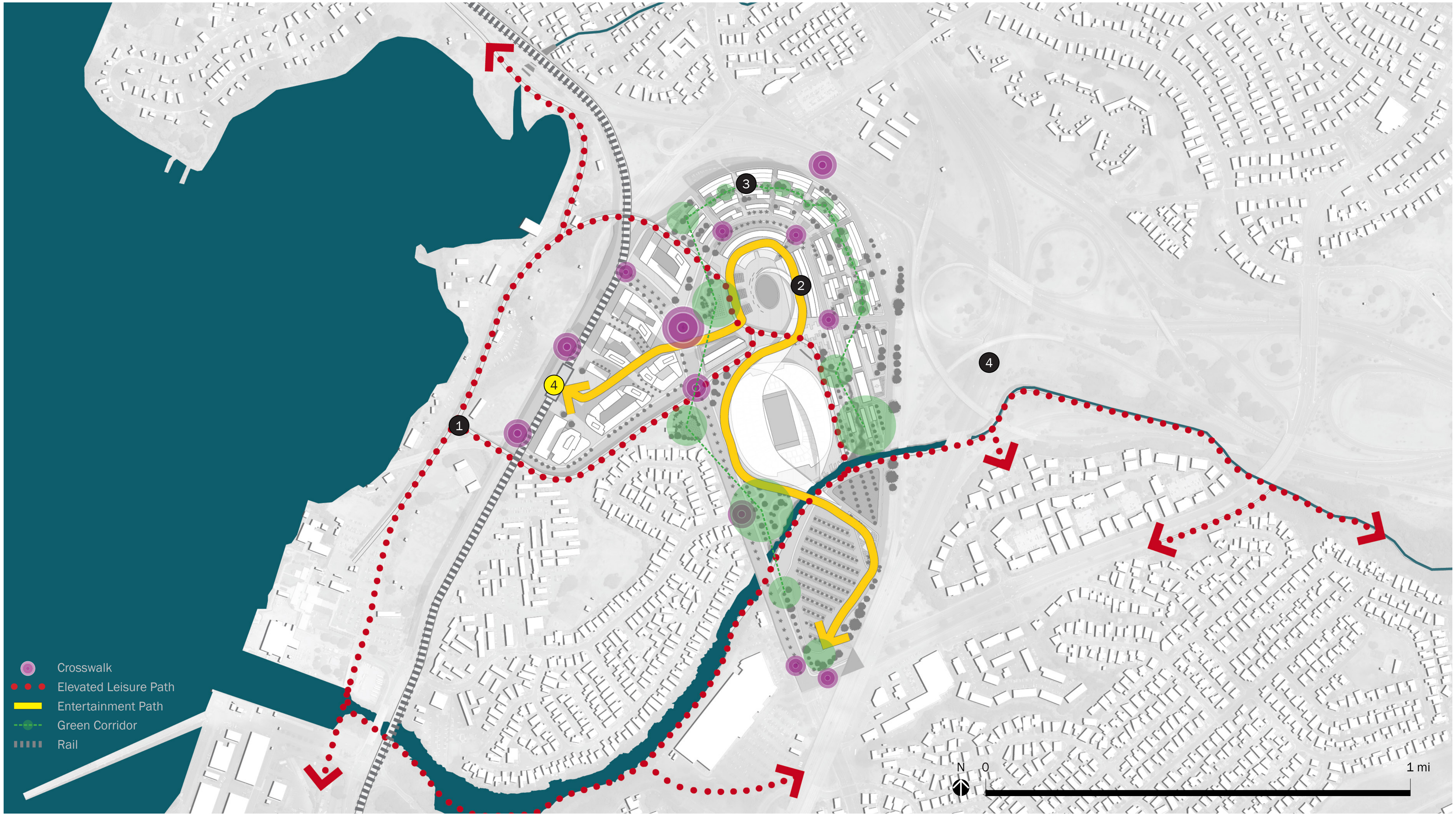
3. Only Connection to Aiea

(Author)

4. Multiple Freeways

(Royce Bair, Flickr)

Figure 4-4 Urban Scale: Reconnecting People and Space



1. Elevated Leisure Path

(DISSING+WEITLING)

2. Entertainment Path

(Newport US RE)

3. Green Corridor

(University of Virginia)

4. Rail

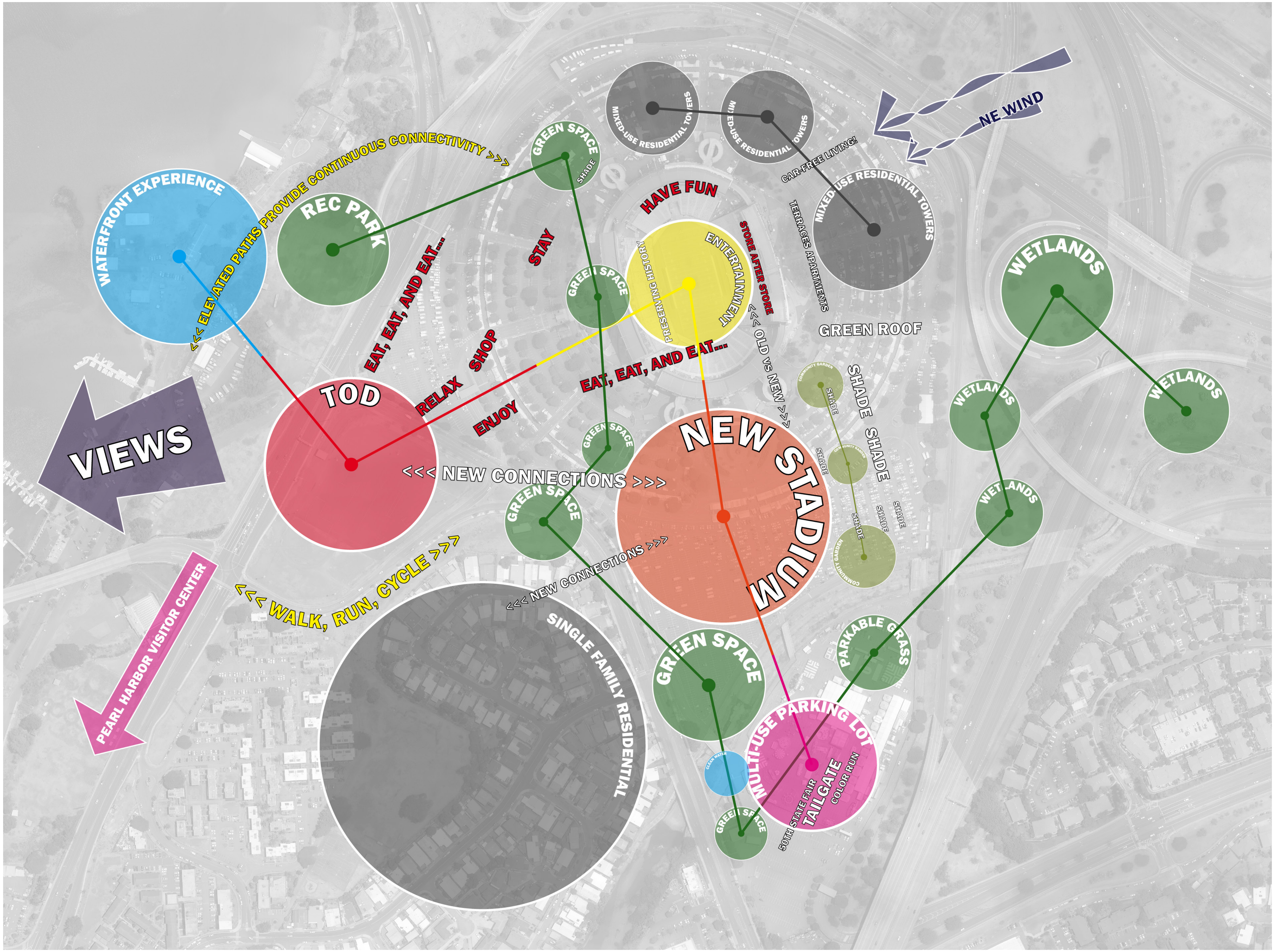
(HART)

4.3 Site Scale

This section illustrates how and where the five design principles—public space, access and transportation, ecological design, sea level rise and flood mitigation, and stadium reuse—are implemented. The focus lies on the immediate Aloha Stadium property and the development area near the future rail station. The area within the quarter-mile radius cited in the City and County's TOD proposal has a solid program that has been researched and designed by experts. Considering the both that level of expertise and the requirement for high-density development around the station, planning within the block from the station are left as proposed in the existing design, just supplemented by some additional design suggestions.

The following two-page segments comprise one page listing the framework and components of the design, and one page from an illustrative site plan highlighting each design principle in the first page. At the very end of this section, all illustrations will be layered and illustrated as a single, collective site plan.

Figure 4-5 Site Scale: Concept Program Diagram



4.3.1 Public Space

To transform this site into spaces accessible to the public, connections to and from the site must—as mentioned in the urban scale design—be improved, but consideration must also be given to smaller scale design strategies that make the site a place truly worth visiting. While the structures on site are large and not necessarily human scale, they are broken up with public spaces in between, resulting in a more relatable scale for users' comfort.

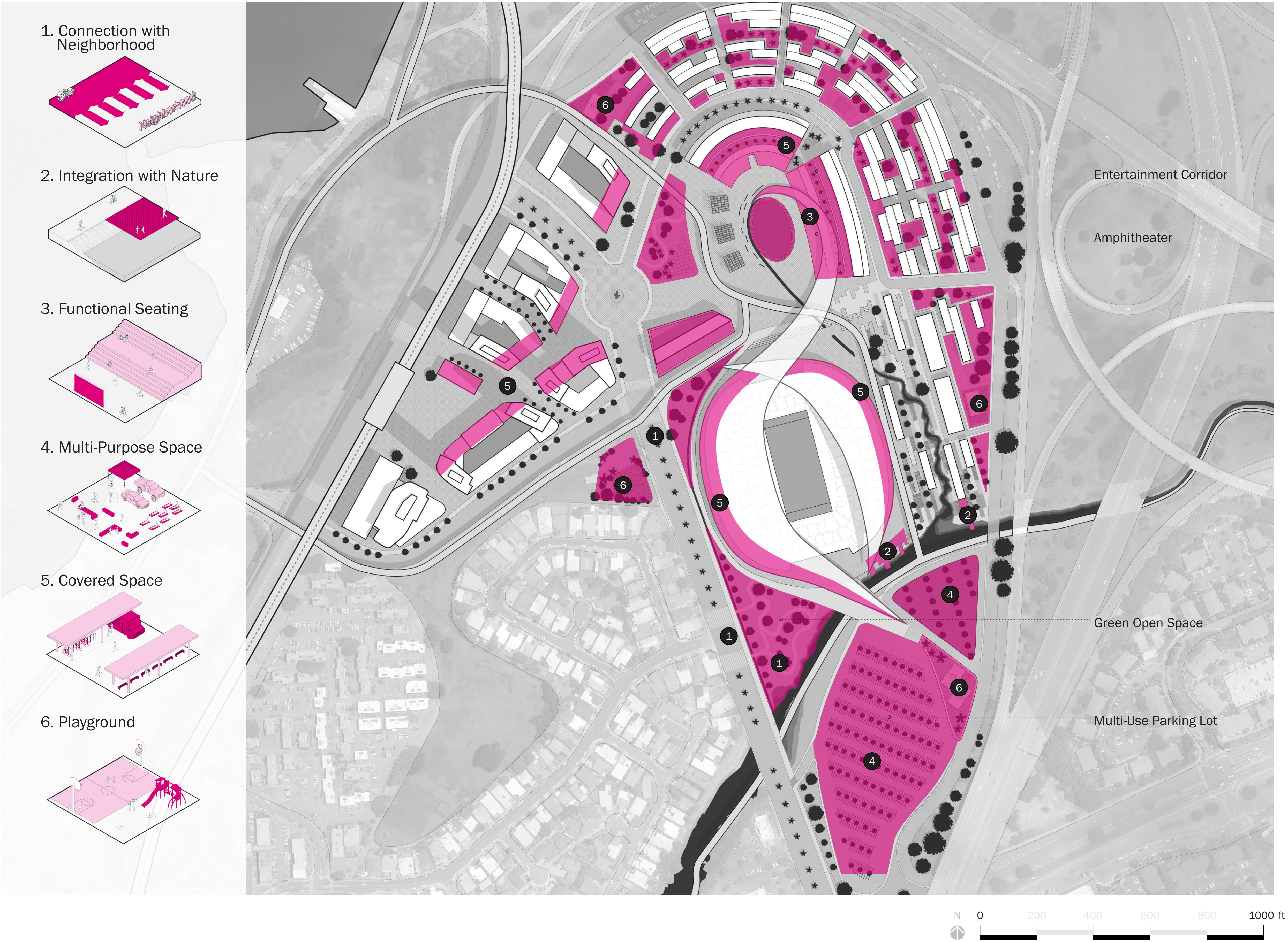
- Entertainment Corridor
    - The continuous language of mixed-use with retail at the ground level.
    - Indoor event spaces, offices, and some residential on the upper floors.
    - Parts of the new stadium accessible every day, especially the spaces facing outward from the structure.

- Amphitheater
    - A large open space where the field used to be.
    - Could be used for events, graduations, concerts, outdoor movies, etc.
    - A place that becomes the focal point for the site.

- Multi-use parking lot
    - Flexible paved space (or something that will substitute for that).
    - Location where tailgating, swap meets, carnivals, and other existing events could be held.
    - Must take advantage of the stream.

- Green open spaces
    - Pocket spaces of green (although still large due to the size of the site).
    - Places that could be for the community to use.
    - A buffer between the facility and residential areas.

Figure 4-6 Site Scale: Public Space



4.3.2 Connectivity

All methods of connecting distant locations with the neighboring communities as well as within the site must be improved to attract users and activate the site. This section focuses on the connections to the stadium in other key programs designed for the immediately surrounding areas.

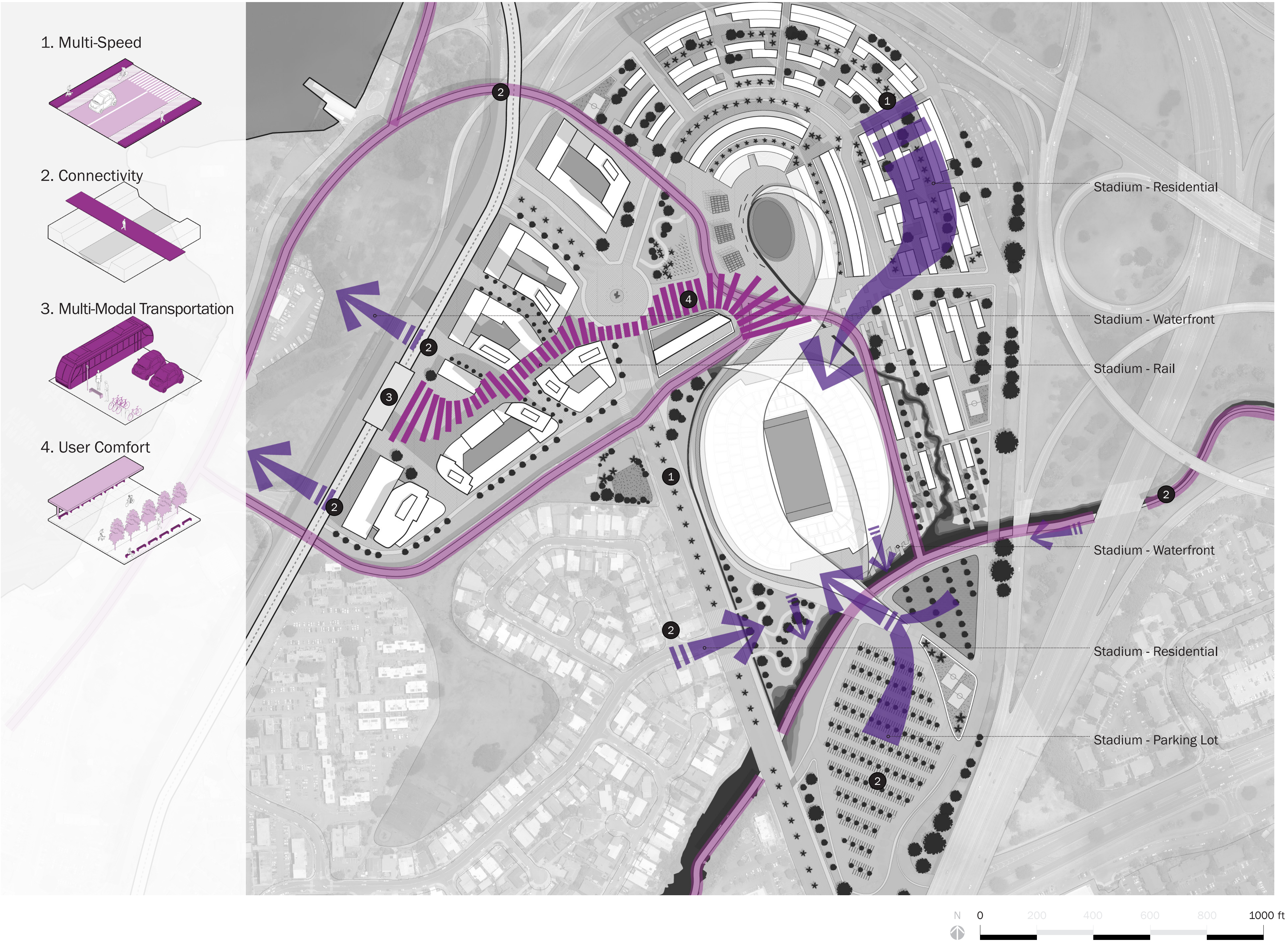
- Stadium – Rail
  - Direct access to the stadium on ground level.
  - Wider paths for larger events and the potential visitors using rail.
  - Will also be along the “entertainment corridor”; must feature qualities of a space to occupy as well.

- Stadium – Residential
  - Should become a place that welcomes the community.
  - Direct access spaces such as parks, plazas, retail, and eateries within the stadium district.

- Stadium – Waterfront
  - The waterfront should be considered a part of the extensive open space; there is a need to connect the two areas.
  - Multiple paths that connect the two spaces (ground and the elevated path).

- Stadium – Parking
  - Similar to the access from rail, there is a need for a path sufficiently wide to accommodate visitors for events with larger crowds.
  - The connection, especially from the tailgate parking lot, is crucial, as it will be crossing the stream.

Figure 4-7 Site Scale: Connectivity



4.3.3 Ecological Design

Although incorporating ecological design into stadium design presents a number of challenges, breaking down the site into smaller components allows us to pursue various strategies that can aid in restoring ecological functions to the site. This will increase requirements for resources, especially energy and water, but these resources can be collected through a more ecological means using renewable energy.

- Increase permeable surfaces
  - Implement green spaces as much as possible and utilize permeable pavements where harder surfaces are required, especially roads and parking lots.

- Water management systems
  - Direct the water on site to the stream using the slight gradient of the topography.
  - Collection and reuse of rainwater can be an effective way to reduce use of municipal potable water.

- Constructed wetlands
  - Strategically place constructed wetlands to clean the run-off on site.

- Community gardens
  - Gardens can increase biodiversity, soil quality, and water retention as well as access to fresh foods.

- Renewable energy harvesting
  - Collect solar and wind energy on rooftops for use on site, for residents' use, and possibly in illuminating public spaces.

Figure 4-8 Site Scale: Ecological Design

4.3.4 Sea Level Rise and Flood Mitigation

Most of the defense strategies against climate and weather events suggested for this site are soft defense strategies. Additionally, while the stadium and its immediate surroundings are not included in areas that will be affected by sea level rise or flooding, the site could help mitigate impacts on local residents, providing infrastructure to support locations affected by such disasters.

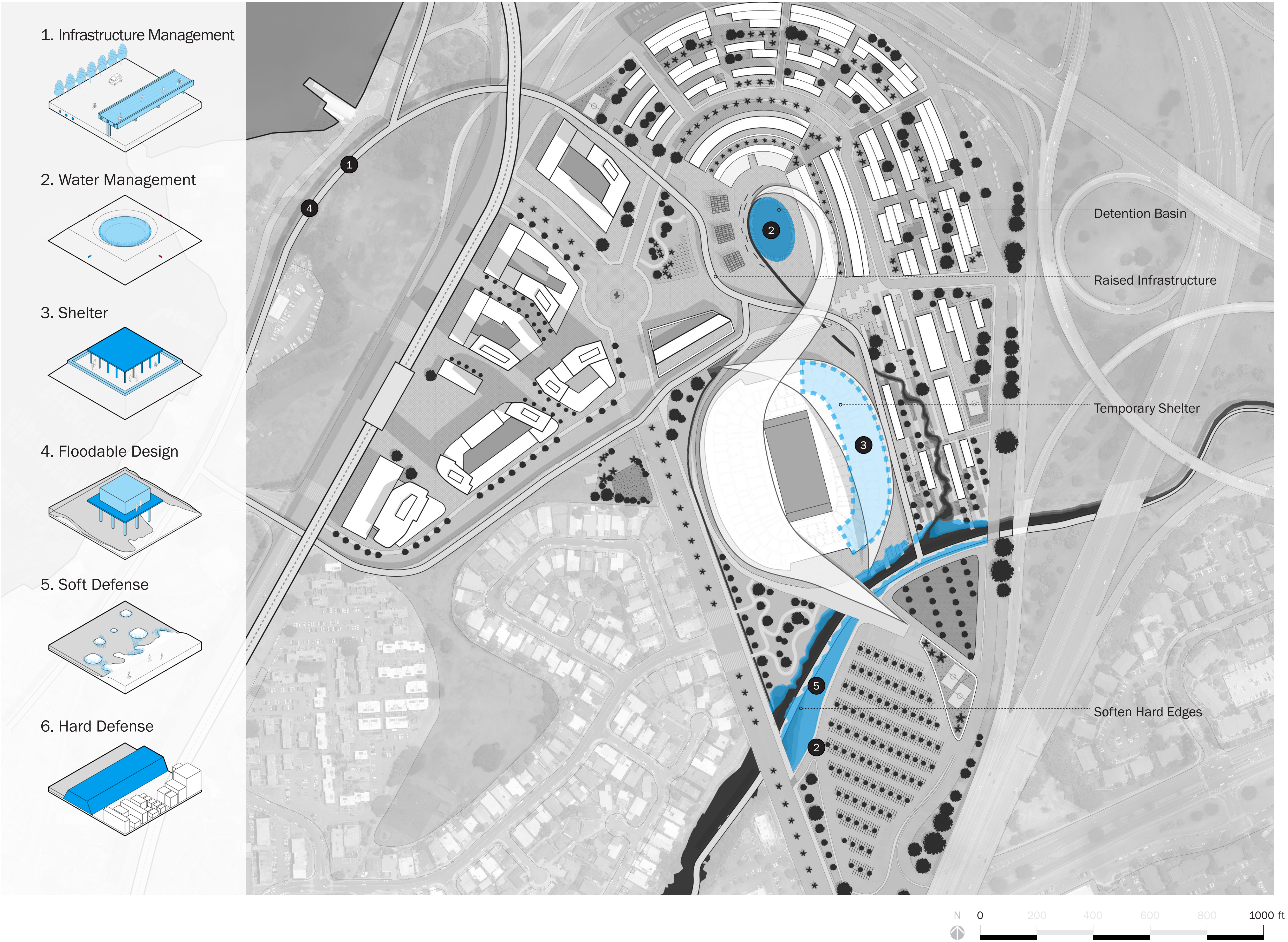
- Soften the edges of stream
    - Return the stream to a more natural state such that it could better infiltrate and retain the water, especially in comparison to the stream's present paved canal-like condition.
    - More greenery and organization for better comfort and aesthetics for users, especially for the path along the stream.
    - Place floodable spaces (green space, playgrounds, etc.) where there is a higher possibility of flooding.

- Dry detention basins on site
    - Although there are more permeable surfaces proposed on site, these will help retain and release water back to the stream at a controlled rate to avoid flooding at the lower lining areas of the stream.

- Temporary shelter spaces
    - Design spaces that could potentially shelter large numbers of people, such as convention/reception halls in the old stadium district and under the stands in the new stadium.

- Raise infrastructure
    - Raise critical infrastructure for areas that will be affected by extreme conditions in the future (also an element of "access and transportation.")

Figure 4-9 Site Scale: Sea Level Rise and Flooding Mitigation



4.3.5 Stadium Reuse

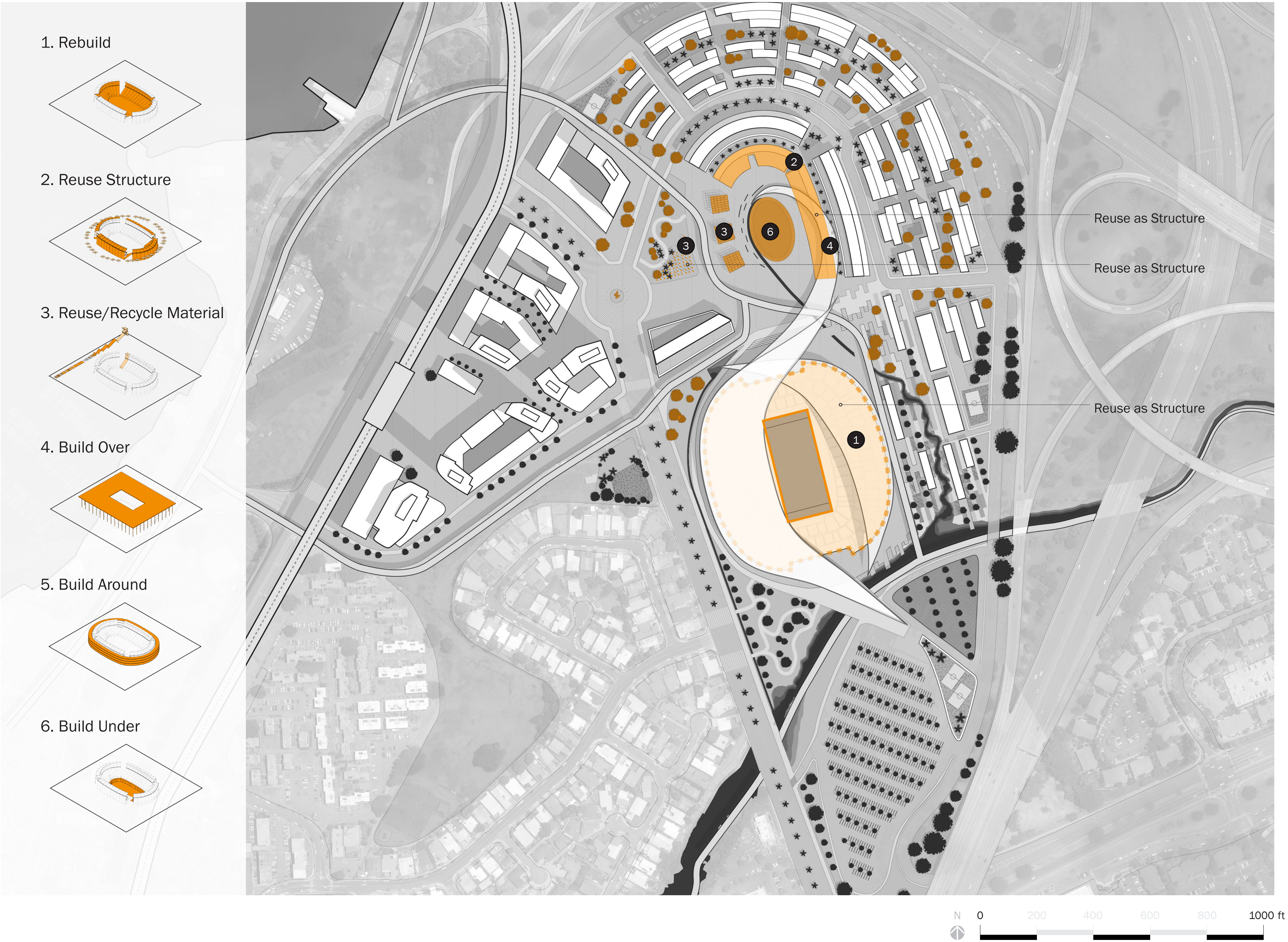
Although the reuse strategy may differ from the precedents in Chapter 2 due to current structural and maintenance cost concerns, most of the old stadium will be demolished, except for a section of the lower stands and some of the structure for the sculpture park. The reused structure reflects the new program, wherein the old stadium is repurposed as the center of the entertainment district.

- Relocate stadium to the site proposed by the State
  - This placement allows for a better ocean view for hotel, residential, and office buildings.
  - The topography of that section of the site is less severe in comparison with the location proposed by the City and County.

- Reuse parts of the old stadium
  - The stadium has become an iconic structure in the area, and some of it should remain as a part of history.
  - Keep the bleachers of the south and east for the amphitheater.
  - The rest of the structure to be demolished, replaced with retail and office spaces.
  - This area will become a part of the entertainment corridor.

- Demolish most of the stadium (recycle material)
  - Maintaining the current stadium structure would be too costly.
  - Use as many of its parts as possible in new construction.
  - Remaining unusable material on site must be recycled.

Figure 4-10 Site Scale: Stadium Reuse



4.3.6 Proposed Site Plan

The first foldout page is a rendering illustrating the new site plan when the five frame work categories are summarized. The second foldout page shows the different areas within the site, including designs carried over from the existing proposals.

- Public space
  - A range of programs (commercial, residential, parks, public plazas, etc.) as well as flexible spaces to serve different types of users and maintain a constant flow of people.

- Connectivity
  - Improvement in the quality and comfort of access to and from the site via all different types of transportation.

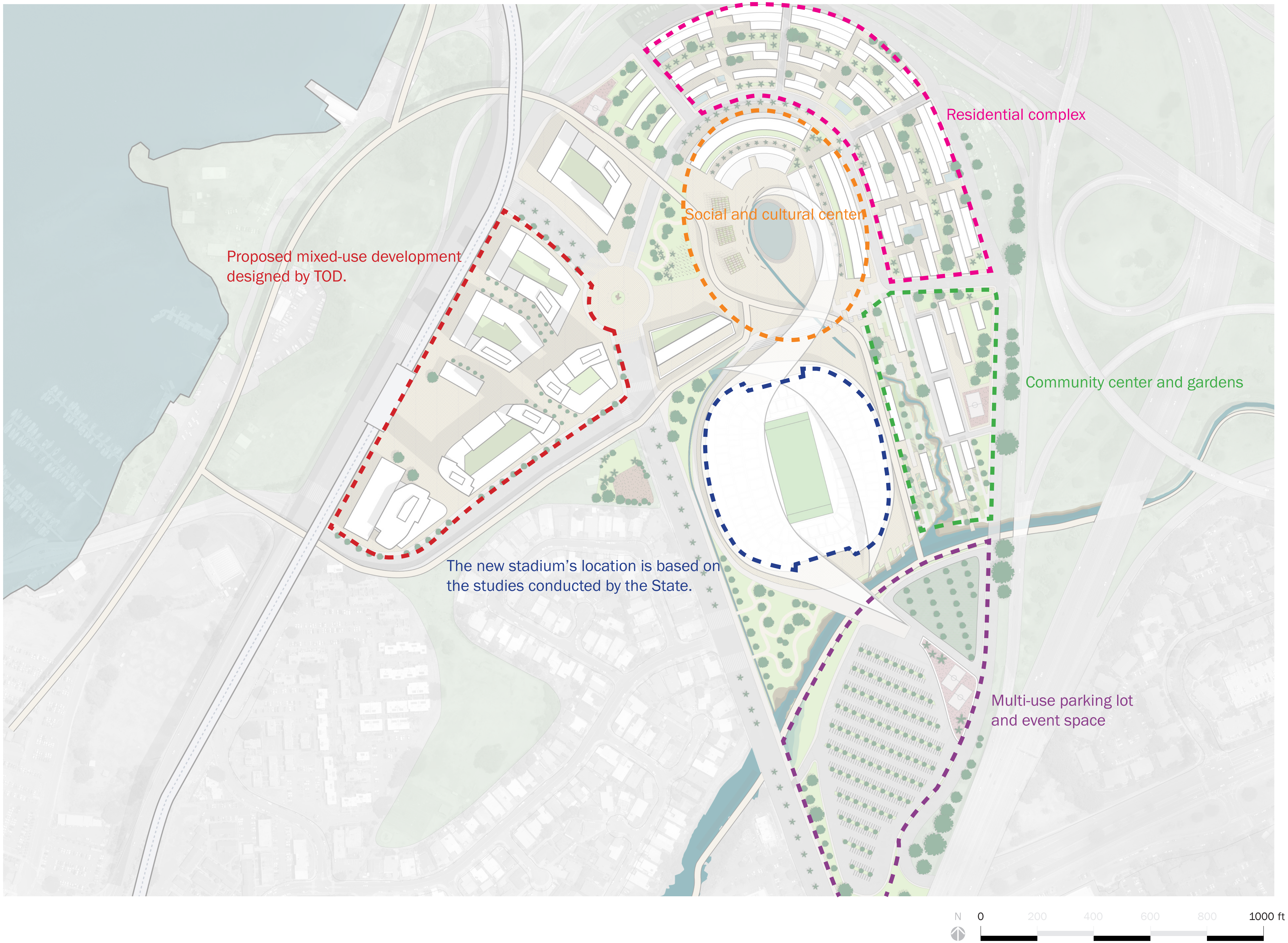
- Ecological design
  - Ecological design strategies that will benefit the residents and visitors of the site, while also improving the environment.

- Sea level rise and flood mitigation
  - Implementation of design concepts that mitigate or adapt to possible future conditions.

- Stadium’s remainder
  - Demolition of most of the stadium and while maintaining the footprint when building new structures to maintain the soul of the old stadium.

Figure 4-11 Site Scale: Proposed Site Plan

Figure 4-12 Site Scale: Proposed Site Program



4.4 Illustrative Concept Scale

This section of the design proposal focuses closely on three project areas: the old stadium district, the residential terrace, and the Halawa stream promenade. The illustrations developed for these zones exemplify key design principles. The old stadium district is where components of Aloha Stadium are reused as a mixed-use entertainment center development with retail at the ground level and offices and event spaces above. The residential terrace located on the perimeter of the old stadium will provide a significant number of additional living spaces within walking distance of the future rail station and transit-oriented development. These new residential units will also supply a core user group for the retail spaces nearby, in addition to users that visit the site and its proposed new amenities. Lastly, the Halawa stream promenade highlights ecological design strategies and the elevated path, reintroducing functioning ecologies to the site.

Each of the three focus areas will be described in a single page summarizing main concepts and design strategies followed by a page illustrating through section perspectives the activities that are to take place at various levels. Colors used in the drawings indicate the same data categories presented in the previous key principle icons and site scale drawings.

4.4.1 Old Stadium District

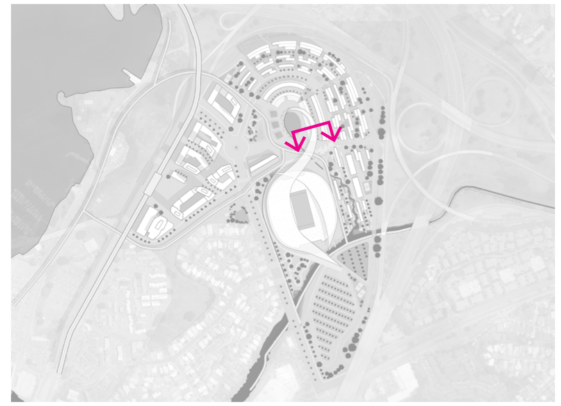
The following section illustrates the reuse of the old stadium whereby it becomes the center for entertainment. The public spaces are activated through storefronts in the mixed-use development and the amphitheater, were people can gather for larger events, and the sculpture park, where visitors can experience the history of the site.

- Reuse the old stadium
    - Stands left unchanged as seating for the amphitheater.
    - Mechanical and storage spaces under points where the ceiling is low.
    - Retail storefront facing the entertainment corridor to continue the language from the mixed-use development around the station.

- New construction replacing the old stadium
    - Retail at the ground level facing the old stadium bleachers.
    - Parking and reception/convention halls facing the terraced apartments.
    - Office spaces and semi-public spaces above the retail and parking on the ground floor.

- Public spaces featuring various paces
    - Amphitheater/plaza where people sit and relax to enjoy entertainment or to take a break.
    - Retail section with a mix of people, some stopping in at stores and others passing by.
    - Outermost section, where people enter and exit the entertainment corridor; very rarely occupied by people.

Figure 4-13 Section 1A: Old Stadium District



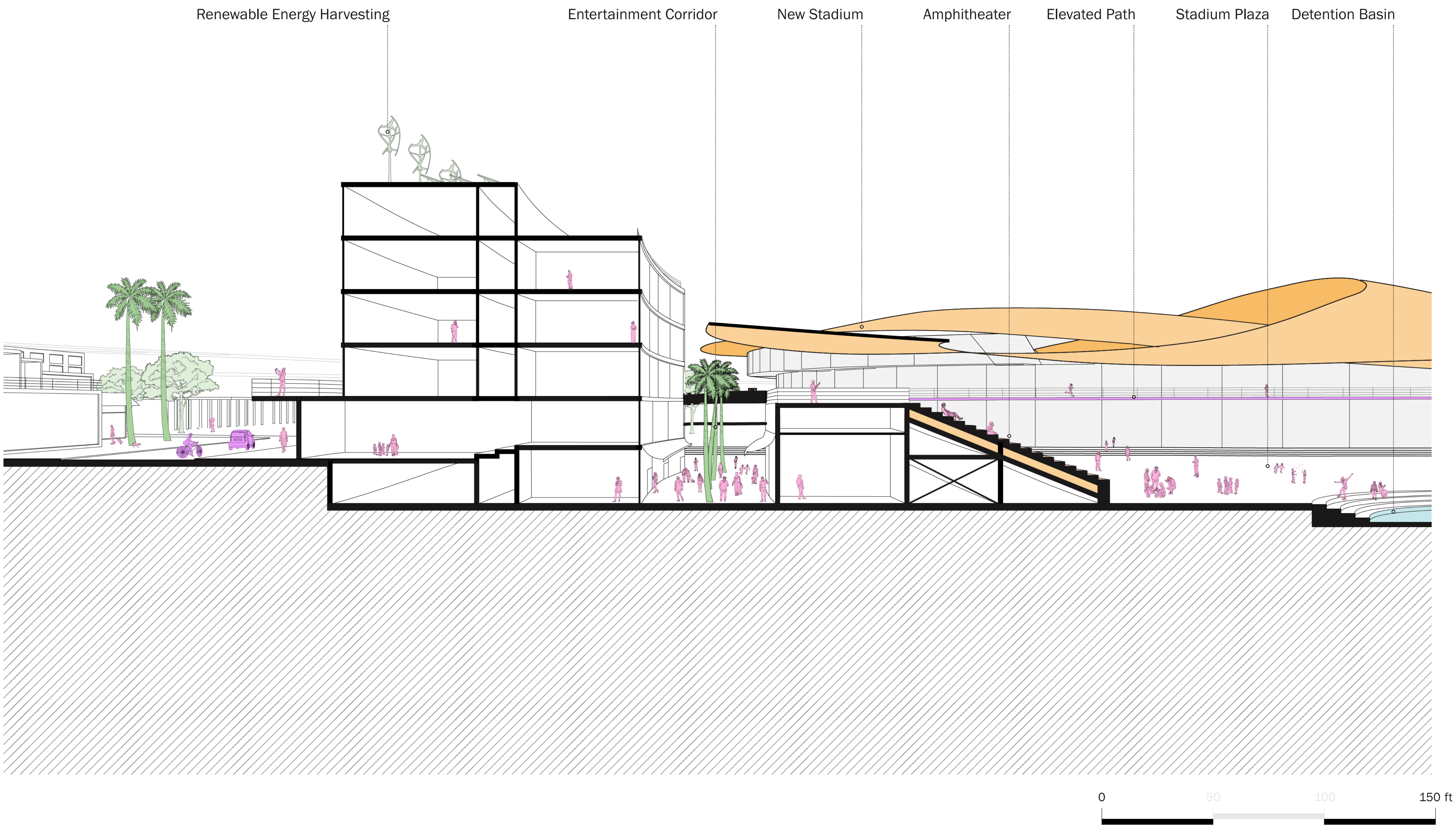
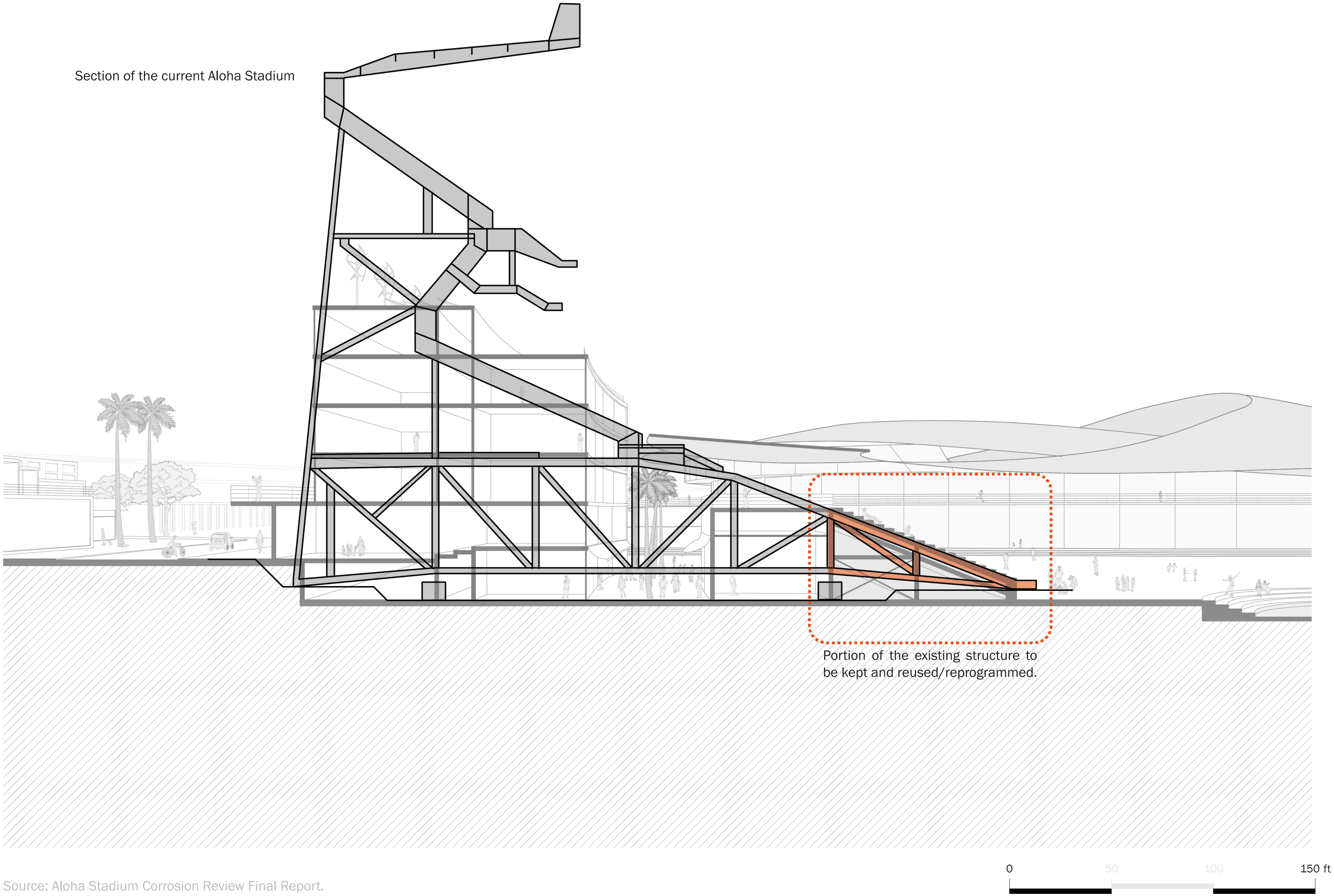


Figure 4-14 Section 1A: Reuse Comparison Diagram



Source: Aloha Stadium Corrosion Review Final Report.

4.4.2 Residential Terrace

This section illustrates the new residential buildings located next to the old stadium district. Although most of the spaces are residential and therefore private, there are public spaces for people to interact on the ground floor. There are also two basic types of corridors, one that is more public and includes some retail spaces, with the other having more green that has some performative functions.

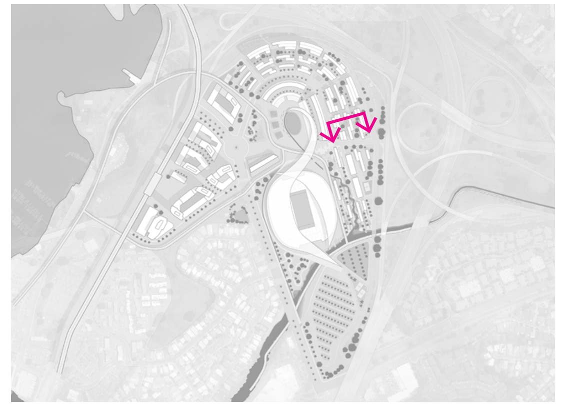
- Underground parking
  - Portion of the property with the highest elevation, allowing underground development to accommodate parking for residents and visitors.

- Residential terrace
  - Concept of the terraced residential towers mimics the language of the stadium and its stands.
  - Form also allows more units to have outdoor spaces rather than requiring residents to go to a shared roof space.
  - Having residences face the bay provides views of the water visible between the station development.

- Collection of water and reusable energy
  - Rainwater collection for non-potable use.
  - Solar panels and wind turbines to generate energy for the residents.

- Small restaurants and cafes at the ground level
  - Extension of the old stadium district that is primarily for the residents, but not limited to them.
  - Locations where crops harvested from the community garden can be used.

Figure 4-15 Section 1B: Residential Terrace



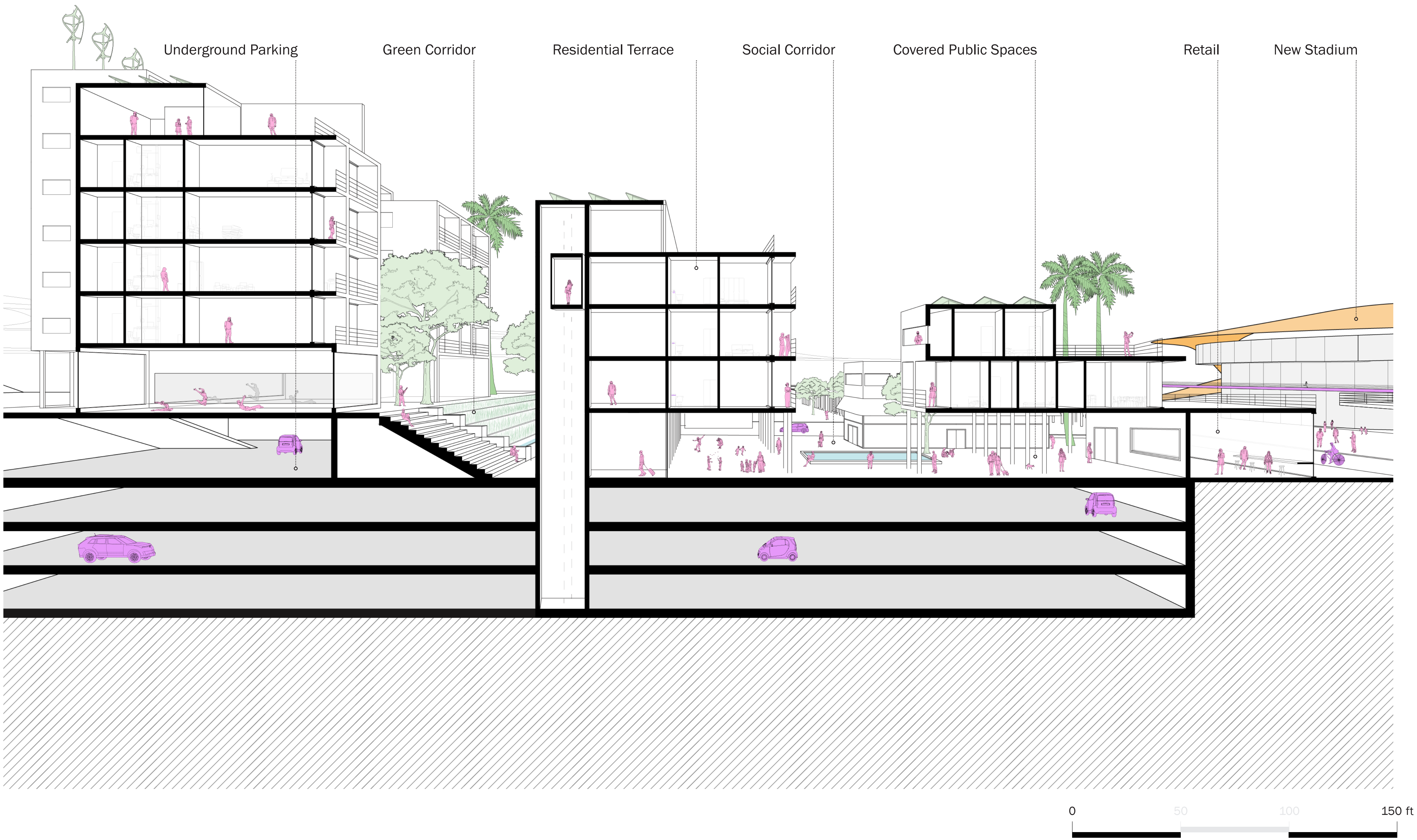
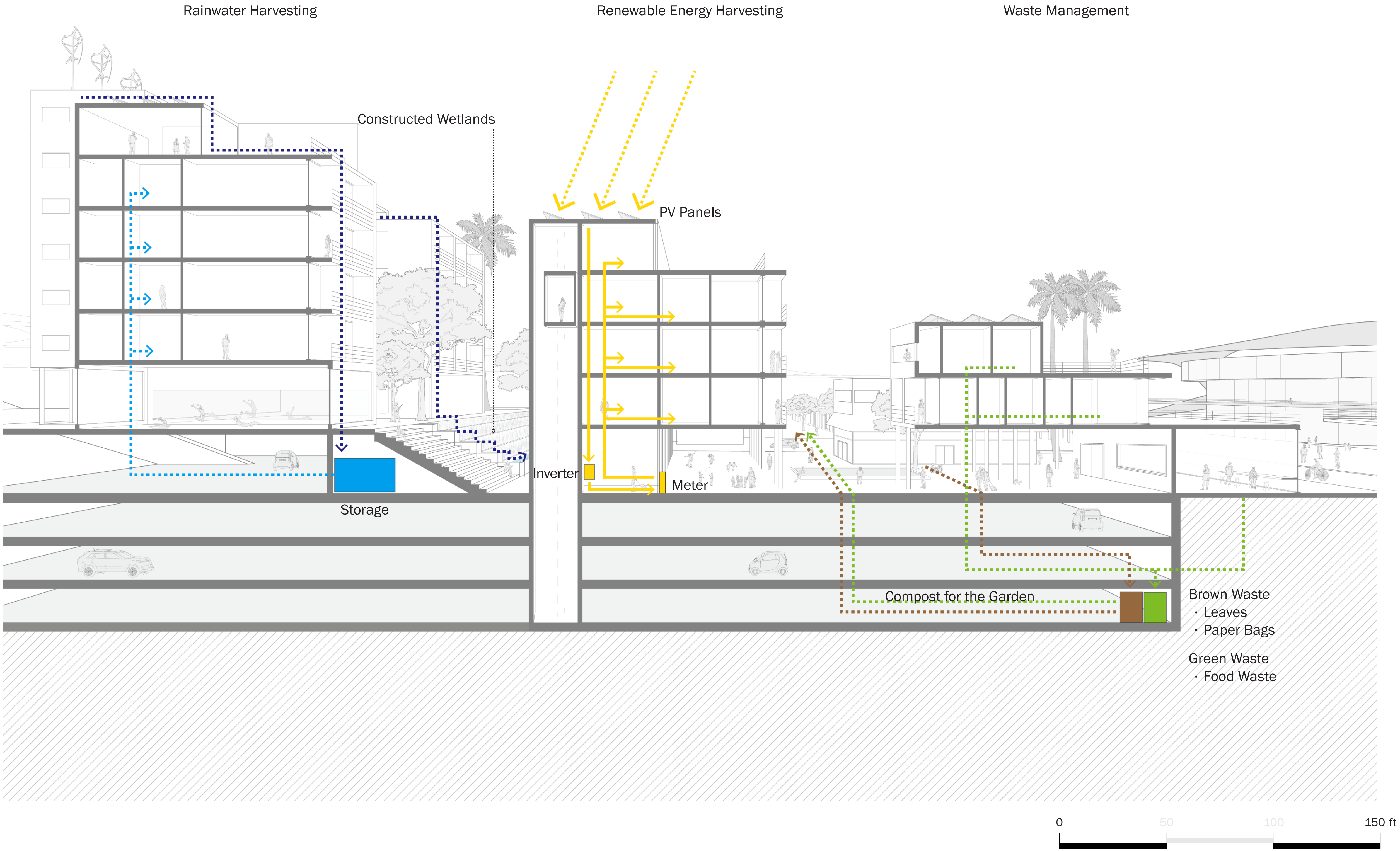


Figure 4-16 Section 1B: Water Management and Reuse Diagram



4.4.3 Halawa Stream Promenade

This section illustrates a section of the leisure path along Halawa Stream, the wetlands that help soften the edge of the stream, and the community gardens, where people in the community can interact in a new way. The focus here is on ways to reactivate the stream to make it a place that individuals will want to walk or run along, while using ecological design strategies.

- Reviving Halawa Stream
  - Restoration of the stream to a more natural state with living systems, instead of a degraded paved channel.
  - Water quality and flood control improved simultaneously with wetlands.
  - Wildlife brought back to increase biodiversity.

- Permeable promenade
  - Promenade surface should also be permeable to avoid as much runoff and pollution.
  - Part of the leisure path connecting the community to the stadium and the stadium to the waterfront.
  - Simultaneously a destination and path.

- Activate and engage programs
  - Direct connections off the promenade to programs along the stream (stadium, wetlands, tailgate, gardens), as well as programs that extend out to engage the stream.
  - Seating and covered places needed for user comfort.

Figure 4-17 Section 2: Halawa Stream Promenade

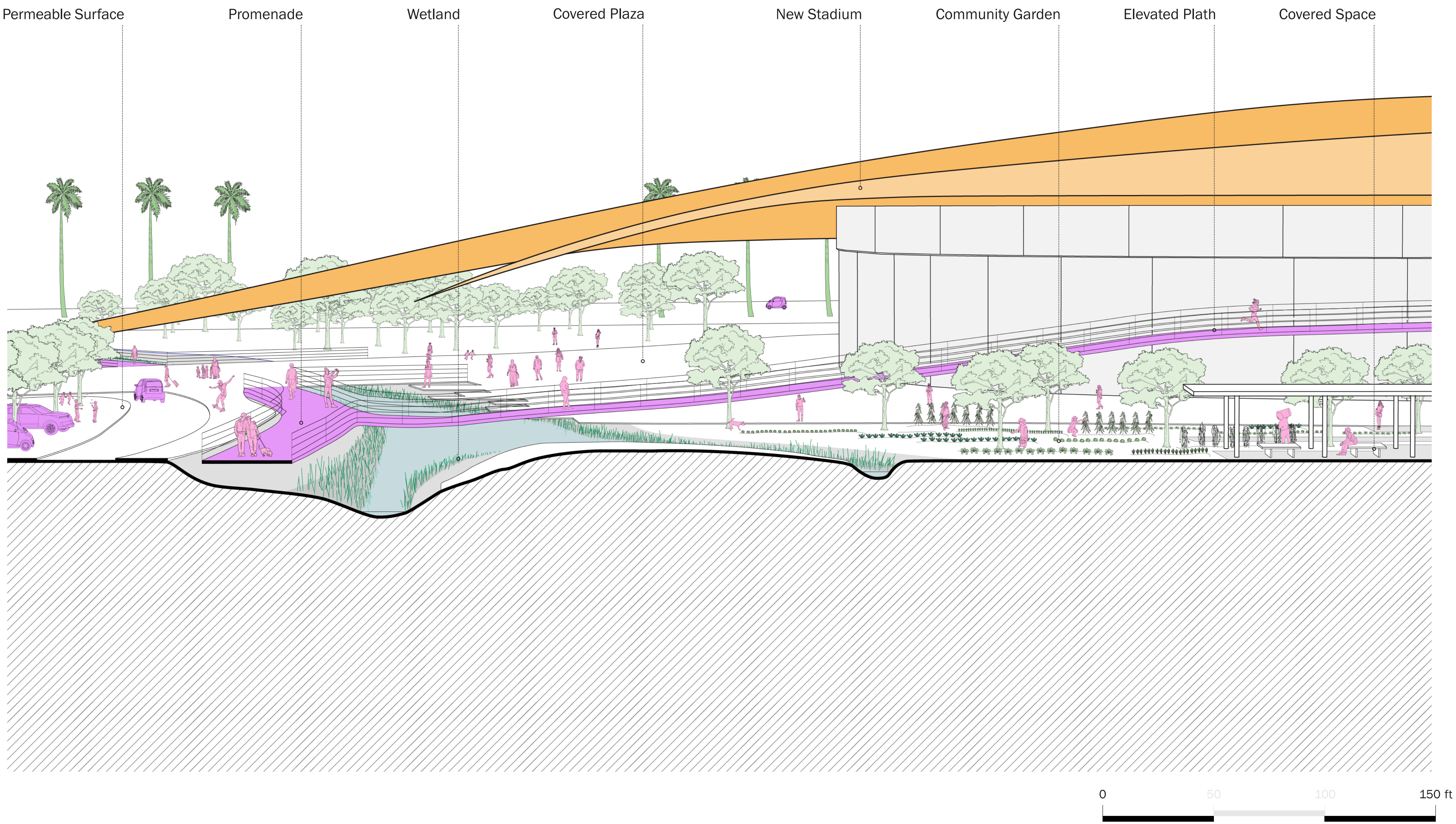
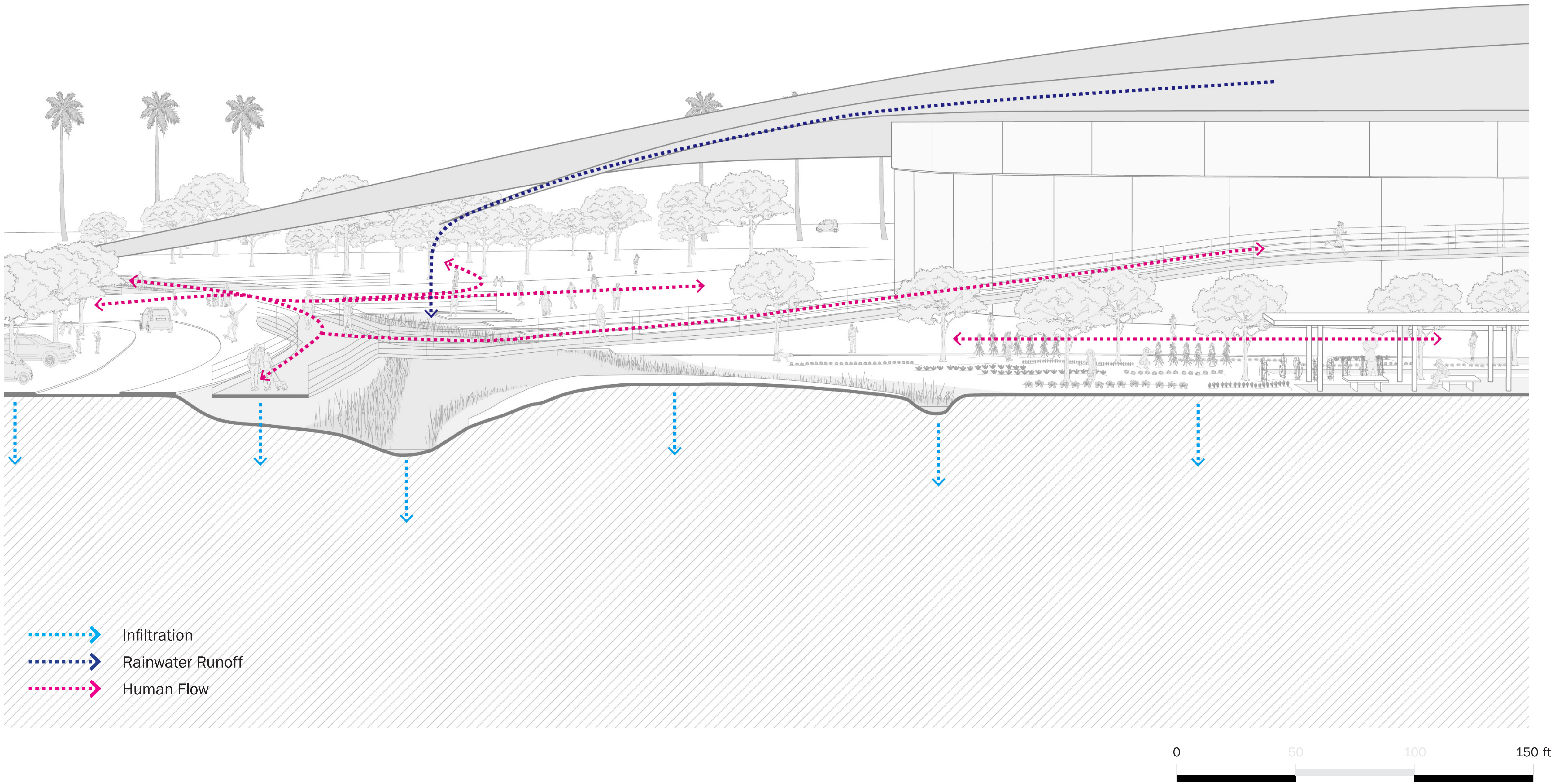


Figure 4-18 Section 2: Water Movement and Human Flow



4.5 Comparing Proposals

The following comparison diagrams are a visual aid indicating how well the design principles are integrated into each proposal. Each principle is evaluated using four to six components identified as key design strategies in Chapter 2; integrated components are highlighted in magenta. However, these principles consist of fundamental aspects that are weak or unmentioned in existing proposals, and do not include principles such as economic or social (affordable housing, diversity, measures to deal with homelessness, etc.) that are some of the key drivers of those proposals.

As the stadium is by nature more of a public space, there are components visible within the design that can be compared with the other principle categories. The City and County proposal does mention the design in more detail, whereas the state proposal is more focused on the stadium itself. As for the access and transportation category, the City and County proposal features a very strong design, with schematic design exploration of complete streets and how they are treated differently in areas around the site. The ecological design components in both proposals are similar in that they propose green spaces, but they do not mention anything further about the functions of these spaces. From the diagram, it becomes obvious that the existing proposals do not mention design strategies related to sea level rise. The primary reason for this may be that they concentrate more on the immediate site, which would not be affected by a 6-feet rise in sea level. Another similar component is the fact that both proposals call for demolition of the entire old stadium and construction of a new stadium on another location on the university site.

The main purpose here is to visualize how the new proposal will cover aspects unaddressed in the existing proposals, thus providing a design that better demonstrates ecological and human focused design. The connectivity with the neighborhood is also established by extending the design area conceptually, allowing us to visualize beyond the developed property. The components of ecological design focus on not only its aesthetic, but on ecological systems that improve the functions of the built environment, while keeping disruption of the natural environment to a minimum. This proposal intends to strike a balance between people and space, built and natural, current and future.

Figure 4-19 Transit Oriented Development Proposal (City)

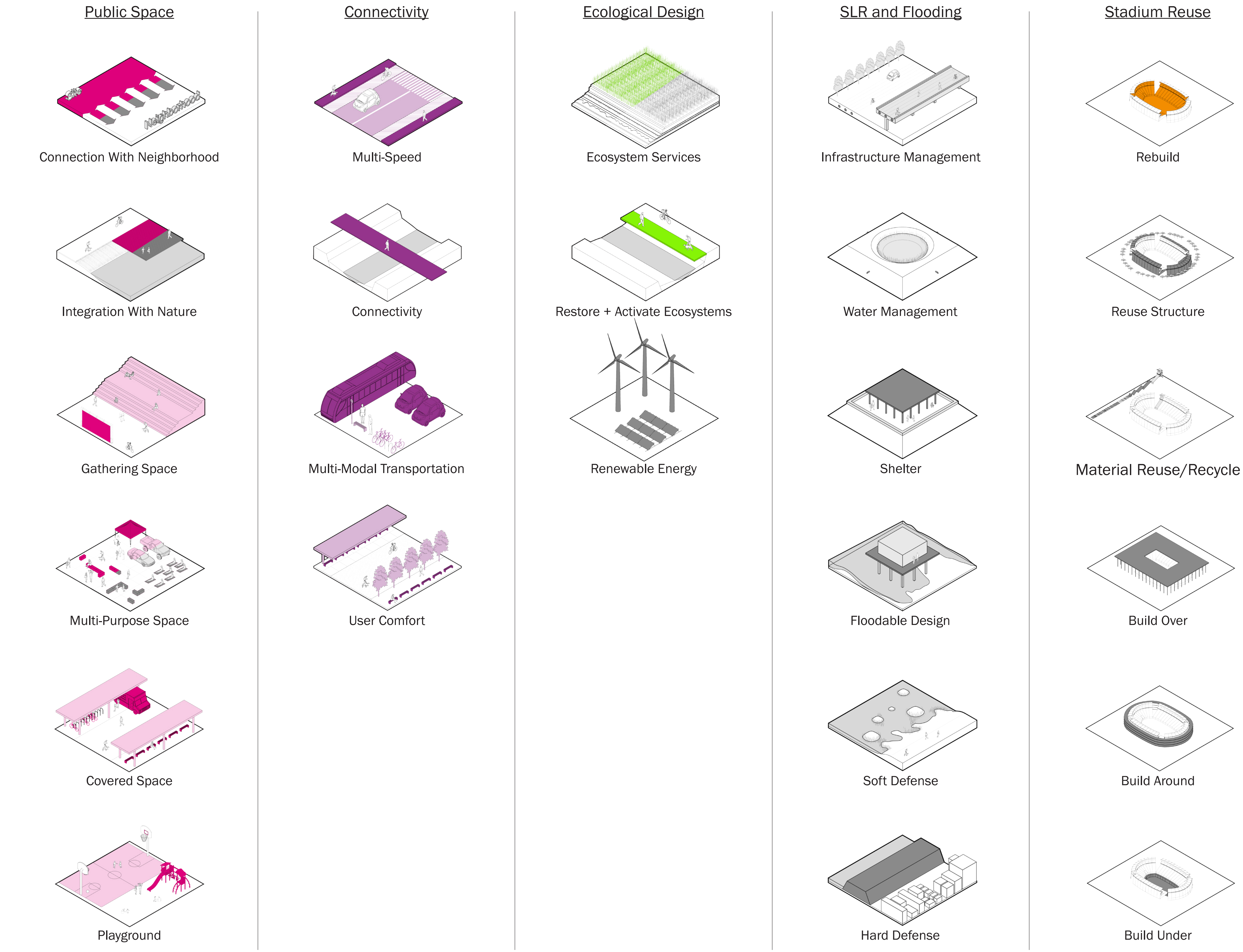


Figure 4-20 Aloha Stadium Conceptual Redevelopment Report Proposal (State)

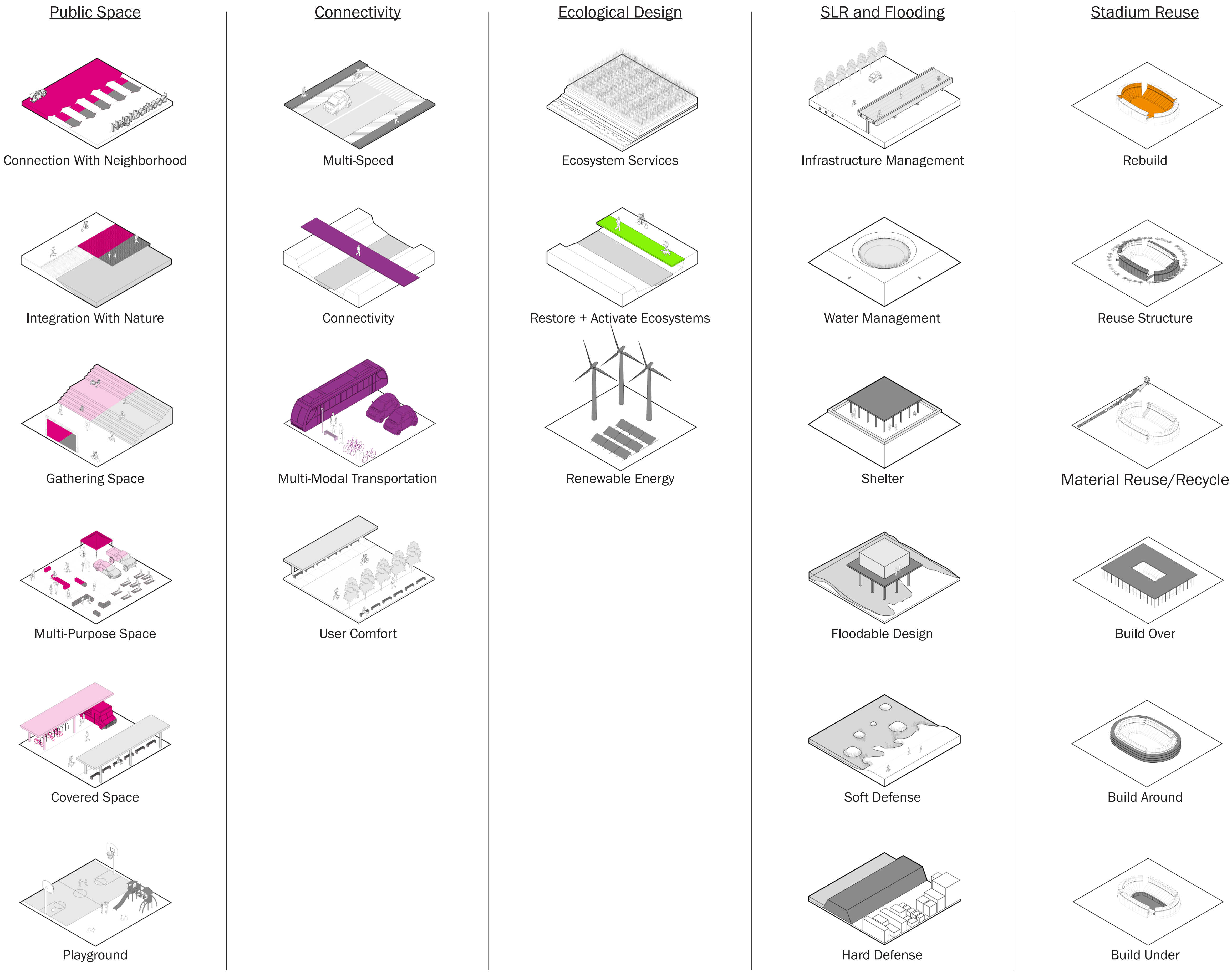
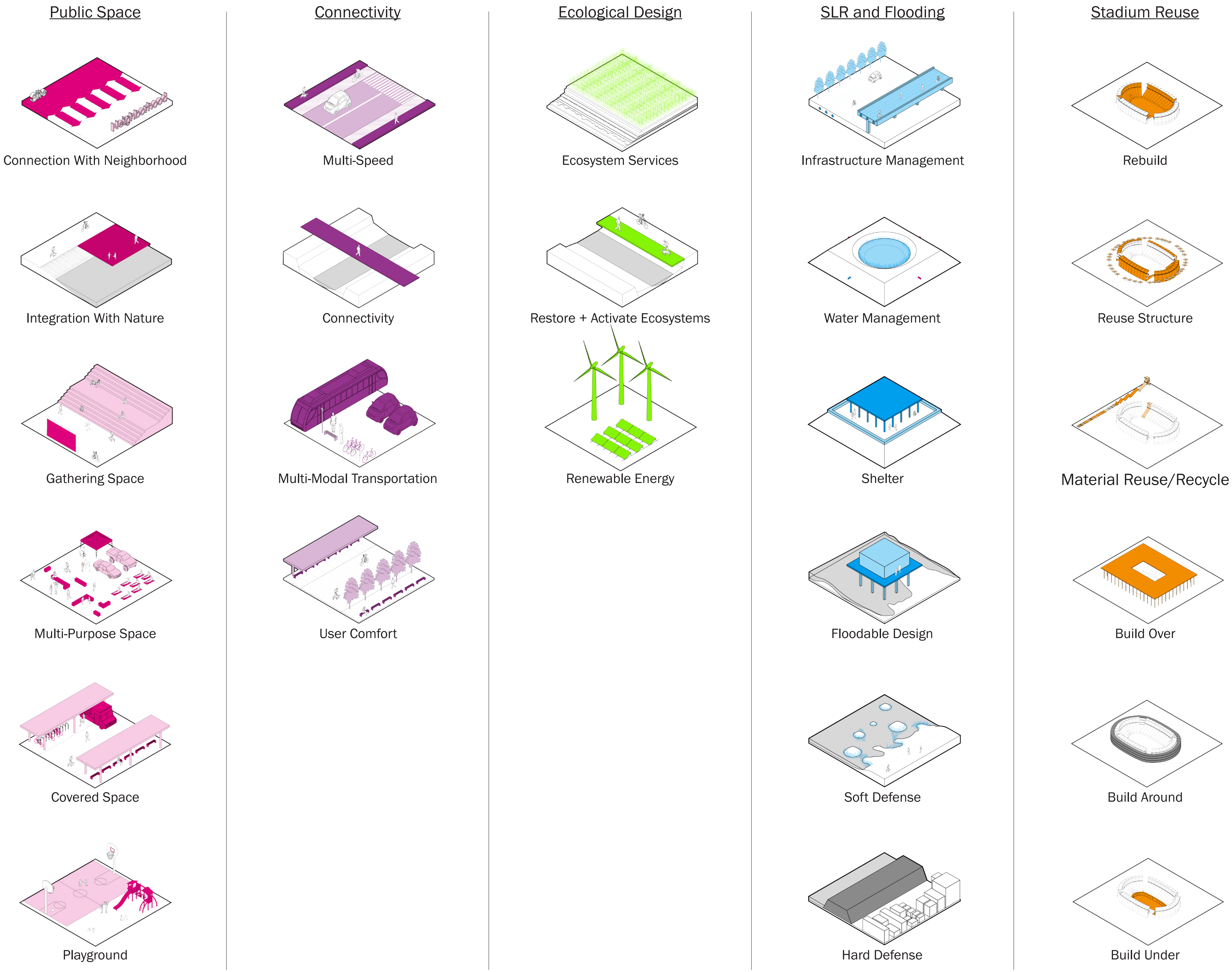


Figure 4-21 New Proposal (Ecological and Human Focused)



5. Conclusion

This project originated with a focus on the overly short service lifespan of many large-scale sports facilities and their poor connections to surrounding neighborhoods, accompanied by a desire to find means of addressing and solving these issues. Although this is a problem encountered the world over, it has become a local matter as well with the question of our own stadium on Oahu—Aloha Stadium—and its structural capabilities, a question that has prompted the idea of a building an entirely new stadium. Simultaneously, the area's planned rail system will encourage denser developments around its stations, thus changing the characteristics of the surrounding neighborhoods. Both ideas—a new stadium and the rail system—were envisioned in separate proposals, one prepared by the State of Hawaiʻi and another by the City and County of Honolulu, with both proposals featuring bold design ideas to make the neighborhood around Aloha Stadium a livelier, more active place. However, the two proposals do not sufficiently address design principles focusing on ecological and human factors. Developed as a response to that situation, this project aims to fill in existing gaps, resulting in an even better, more robust proposal that helps ensure greater resilience in the face of future events.

Since reuse of stadiums is not a common strategy, various methods were used in identifying the information and tools required in developing a framework for the stadium design. The first step involved historical and general research, with investigations spanning from the origins and development of the stadium format to current trends and future prospects. Findings suggested that whereas the typology itself has existed for many centuries, the stadium in its current form developed rapidly in recent years, emerging simultaneously with the development of more advanced technologies. This resulted in inclusive designs for the structure itself, but with a diminishment in other key design principles such as stadium reuse, creation of public spaces, connectivity to surroundings, ecological design strategies, and considerations in dealing with extreme climate and weather such as sea level rise and flooding.

After an examination of literature reviews and precedent studies showing successful implementation of these key design principles, the framework for improving the existing plans was created and applied to the new proposals. In applying the framework to Aloha Stadium, past development plans were used in conducting a background study of the history of Aloha Stadium, and an analysis of the current redevelopment proposals was performed using site inventory and analysis to identify the site’s opportunities and constraints.

A number of design improvements have emerged through this project: eliminating unnatural and unnecessary boundaries to create a better sense of place and allow the site to become a destination for all types of users; improving access and transportation options beyond the rail; providing activity-based paths; increasing consideration of ecological design to enhance the facility's longevity and preserve the surrounding neighborhood as well as to provide the benefits of reusable energy, water, and farming; avoiding major repair/replacement costs by preparing for sea level rise and extreme weather events; and establishing a new stadium—necessary due to the advanced structural deterioration—while reusing the lowest level of the old stadium, both to preserve the site's history and to provide a central space.

This project demonstrates how implementing these principles makes it possible to create greater depth in the quality of the space while maintaining the initial design values of the previous proposals. Although improving the quality of access and public space infrastructure are essential elements, the key to an active and connected neighborhood is in reaching out and connecting communities beyond the site's immediate surroundings.

Without a doubt, the issue of whether to keep and reuse an old stadium or to build an entirely new facility will continue to arise as current stadiums age. As these situations occur with stadiums around the world, rather than responding with inclusive projects divorced from their surroundings, the concepts described in this study may be applied in incorporating current neighborhood needs and understanding the facilities' new roles. Reuse and repurposing of a stadium is only one aspect of extending the facility's useful service life, and future stadium designs will need to incorporate other considerations for the future of these facilities.

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